MINING CONGRESS JOURNAL

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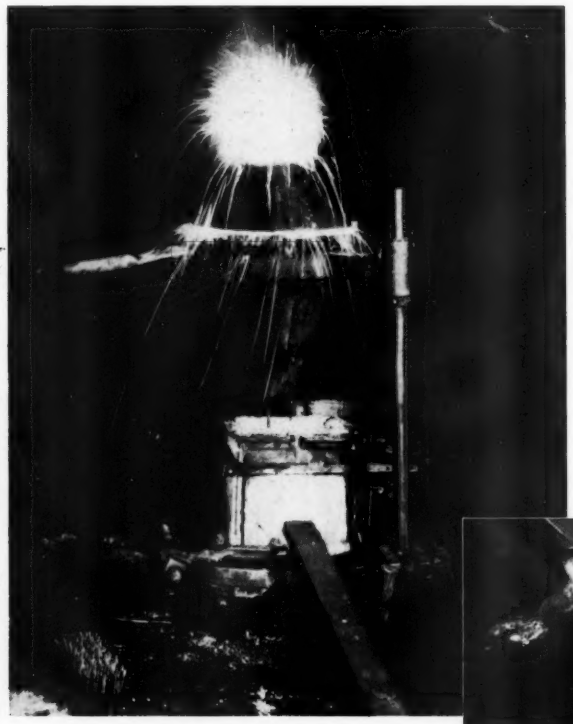
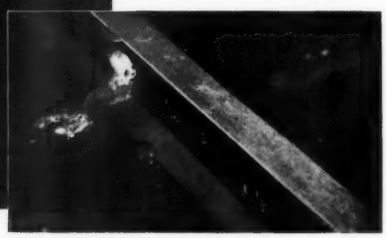
WELDED TRACK





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Vol. 26 AUGUST, 1940 No. 8

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Opinions expressed by authors within these pages are their own, and do not necessarily represent those of the American Mining Congress

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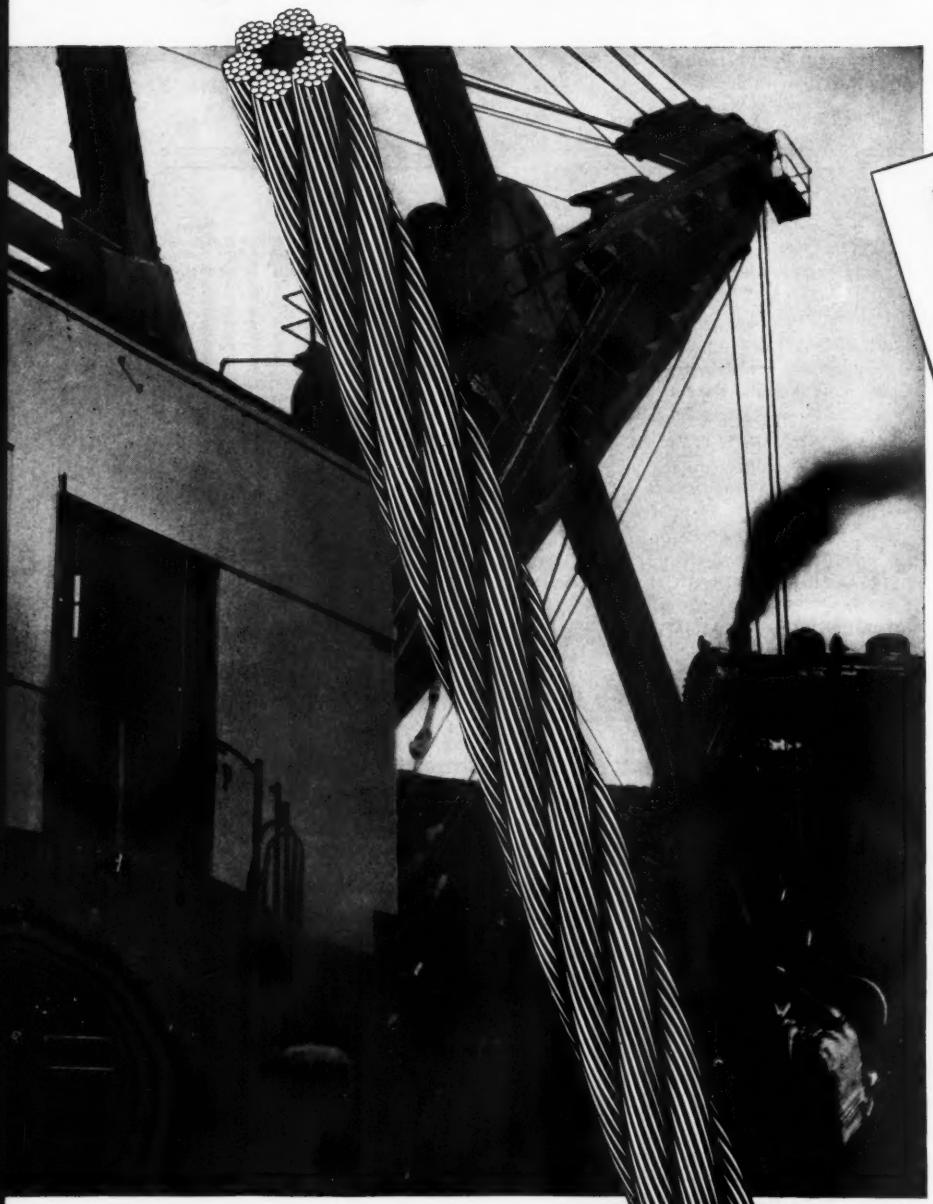
Strip Rope Costs to the Bone...



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Profits in the mining industries depend on ability to pare down operating costs —lower and lower. That is why an ever-increasing number of producers are taking advantage of the cost-cutting ability of Roebling "Blue Center" Wire Rope.

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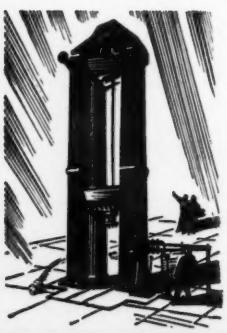

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This machine is typical of the costly and exceptional testing equipment employed by Roebling to make certain that Roebling "Blue Center" Wire Rope measures up to the exacting standards set for it. This equipment has a capacity of 2½ million pounds—is capable of pulling apart a steel bar 6 inches square.

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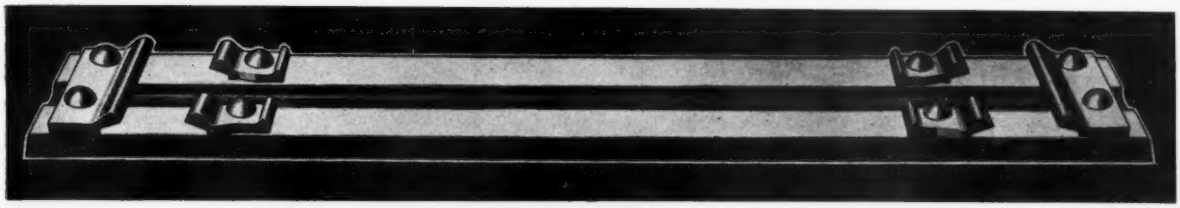
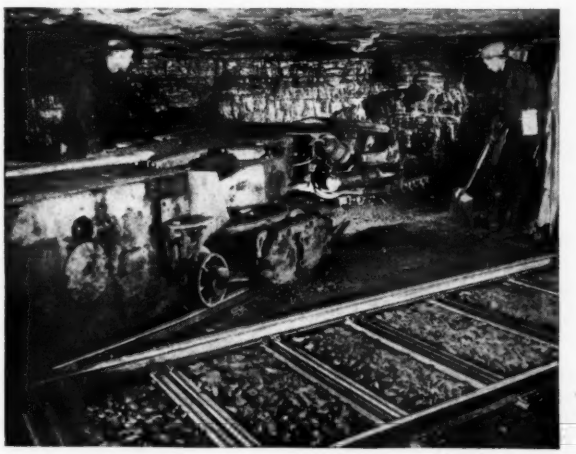
THERE are few opportunities in mining to make an investment that will yield such returns as the purchase of Bethlehem Steel Mine Ties. Savings accrue from three distinct characteristics of these ties, any one of which would make their use worth while.



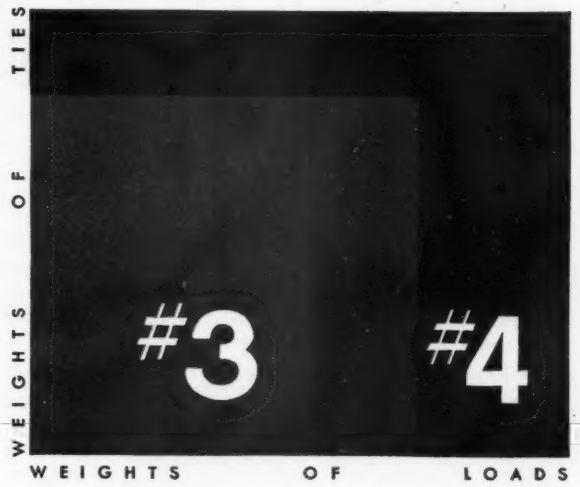
1. Track laid with Bethlehem Steel Ties is rugged and strong—interruption of work from derailments is rare. Rails are firmly supported and can't spread or roll over. The No. 4 tie will stand up under the heaviest of cutters and loaders and it has the stiffness to minimize rail kinking.

2. The use of Bethlehem Steel Ties expedites track laying. One or two blows of a hammer lock the rails in the vise-like grip of the steel clips. Gage can't help but be right, and stay right.

3. Bethlehem Steel Ties save on expenditures for material, as they can be re-laid twenty or thirty times and, of course, no spikes are required.



The No. 3 Bethlehem Steel Mine Tie, with a weight of 3¼-lbs. per foot has ample strength to carry the equipment in most mines.



The No. 4 Bethlehem Steel Mine Tie, with a weight of 4-lbs. per foot and a moment of inertia (strength factor) 42 per cent greater than that of the No. 3, is rugged enough to stand up under the heaviest cutters and loaders.

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• • •

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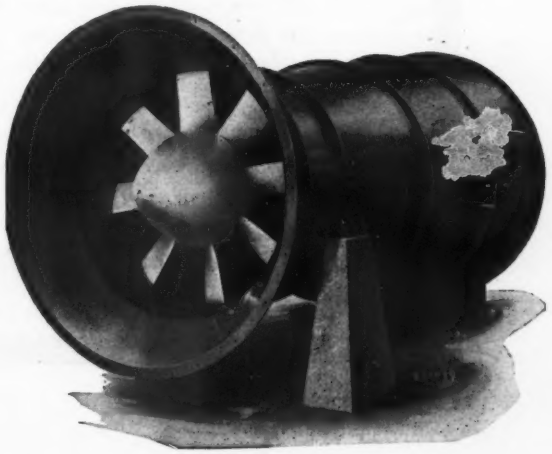
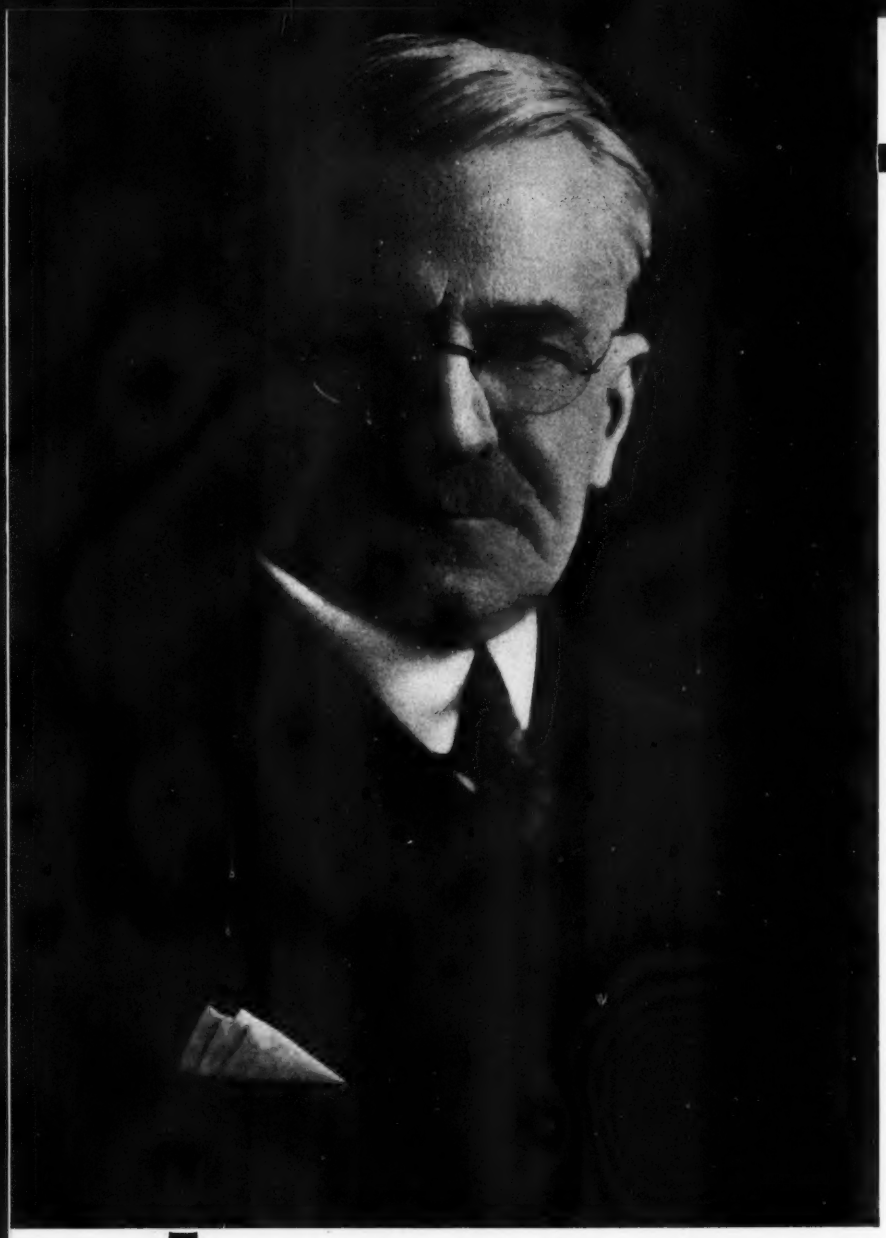




In Memoriam

A long life of rich accomplishment and service to the mining industry came to a close August 4 with the death of James Finch Callbreath, Secretary-Emeritus of the American Mining Congress, in Alamosa, Colo. Still active in his eighty-second year, Mr. Callbreath's never ending efforts to weld all branches of mining together for the common good created a monument in the organization he leaves which will long endure. With the increasingly important part which minerals must play in our nation's future, mining men, in the years to come, will many times have cause to be grateful to "Jim" Callbreath for his genius of organization, of which he gave so freely in time of need.

A JOURNAL FOR THE ENTIRE MINING INDUSTRY—PUBLISHED BY THE AMERICAN MINING CONGRESS

MINING CONGRESS JOURNAL

Vol. 26 AUGUST, 1940 No. 8

Richard J. Lund, Editor

OBSTRUCTING THE DEFENSE PROGRAM

WITH the nation's attention focused on means of expediting the defense program, it is a keen disappointment to note that action to remove one of the most serious obstructions is being delayed for what appears to be political reasons.

A vital need is some means whereby defense plant capital expenditures may be amortized over a short term period. A large part of such facilities will have little or no useful life following completion of the defense program. Private capital must carry the heavy end of this tremendous expansion, but management cannot, in justice to its stockholders, take the urge risk involved unless such short term amortization is permitted.

It is apparent that action on this fearfully important measure has been delayed for reasons of political expediency so that it can be used to jam the hastily considered excess profits tax through the Congress with a minimum of hearings and consideration. The safety and welfare of the country demand that the amortization measure receive immediate and separate attention. The enactment of an excess profits tax at this time will have but little effect on our fiscal situation and should await a thorough revision of the revenue laws by the new Congress in January, 1941.

PROGRESS IN METAL MINE VENTILATION

DESCRIPTIONS of notable achievements in improving ventilation conditions at western metal mines are being featured in current issues of the JOURNAL, and it is gratifying to note this progress in such a worthy field.

The extensive operations of Climax Molybdenum Company, including surface plants as well as underground workings, have been provided with modern equipment to make available more air in all parts of the mine and to eliminate dustiness in the crushing plant, and plans call for even further improvements in the near future. Sunshine Mining Company is completing a program which will "streamline" its ventilation to the lowest depths being worked, involving much costly new equipment and extensive new or enlarged raises between various levels (see pages 23 to 26 of this issue); and Magma Copper Company recently extended its efficient air-conditioning system down to the 4,000 level (to be described in the September JOURNAL).

These are indicative of the remarkable strides that have been made in the past decade in keeping miners supplied with adequate amounts of fresh air as they toil hundreds or thousands of feet beneath the surface. Unless one has actually pushed a muck stick shift after shift under the old and new conditions, it is impossible to realize fully what these changes have meant to the comfort of workmen and to the efficiency of their work. Time after time it has been found that relatively heavy expenditures for improved ventilation have paid real dividends—not only through increasing production per man, but also in reducing the labor turnover and raising employes' interest and contentment in their daily work.

While it is a pleasure to record the progress made to date by such companies as those mentioned above—and there are large numbers in this category—it is equally true that there still are many metal mines in the country which could probably profit from this lesson. Some of these may be approaching in depth their limits of ore bodies or of economic operation, and hence cannot afford the capital expenditure involved in extensive ventilation changes. But others, with reasonably long life expectancy, would do well to give careful thought and study to the advisability of adopting an improved ventilation program, calculating the intangible benefits along with the tangible, and being sure to give both proper weight.

EXPAND BUREAU SAFETY EDUCATION WORK

THE Sonman coal mine explosion near Johnstown, Pa., on July 15 is but another example emphasizing the continuing need for intensive safety education of everyone connected with mining in order to restore the persistent downward trend of previous years in these deplorable catastrophies. Since the initial educational campaign, by the Bureau of Mines, State Mining Departments and mine managements, which began nearly 30 years ago, this country has experienced a constant decrease in coal mine explosions, but it has recently become increasingly apparent that there must be a renewed drive to expand the appropriations for this primary work of the Bureau. Safety consciousness must become the all-embracing state of mind of the coal producers of this country.

This most recent explosion is apparently another case where the human factor has, by commission or omission, been the cause of needless heavy loss of life, and to everyone who understands coal mining, there is but one answer—EDUCATION. The fountain head of safety education is the U. S. Bureau of Mines, and the country must wait no longer—it must insist NOW that the Health and Safety Branch of the Bureau be authorized to expand its educational work in ample measure to meet the needs.

It seems apparent that the coal mines of the United States are entering upon a span of heavy production which may continue for several years; this means that, as has been particularly true in the past ten years, the operations of the mines will be conducted by more and more new men on the managerial staffs and among the workmen. The percentage of older men, who have been educated and thoroughly impressed with the necessity for utmost care and caution in guarding against explosion hazards, is becoming steadily lower. This fact makes doubly necessary a most intensive drive employing the best facilities which can be had for the immediate education of the mine management staffs and the mine workmen of today. Only by this action can the decreases in explosions accomplished over the past 30 years be continued.

Fig. 7
Townsite of Hiawatha, Utah, with new Kingmine preparation plant of U. S. Fuel Co. in right foreground

CONVERTING UTAH COAL INTO CUSTOM PRODUCTS AT KINGMINE

● ***Modernization and Consolidation Program at United States Fuel Company's Plant Has Proven Outstanding Success. Operate Two 7-Hour Shifts Per Day***

By JAMES CASSANO, Engineer
and
G. A. FARNSWORTH, Engineer
United States Fuel Company

"KINGMINE" of the United States Fuel Company is located at Hiawatha, 18 miles southwest of Price, Carbon County, in southeastern Utah. Previous to 1938, three separate mines—King No. 1, King No. 2, and Panther—were operated by this company. At that time a modernization and consolidation program was decided upon. Panther was shut down. King No. 1 tipple was modernized, as later described; a new, up-to-date blending plant was constructed nearby, and the two King mines were consolidated into one large mine now called "Kingmine." Market demand can now be supplied by operating "Kingmine" and preparation plant two 7-hour shifts per day. A description of the operation follows.

Seam Conditions

The coal lies in the Blackhawk formation of the Mesaverde group. It overlies the Star Point Sandstone, the bottom member of the group, and lies next to the Mancos shale. The coal bed varies in thickness from 6 to 22 ft. A shale parting is generally present about 12 ft. from the floor. This parting varies in thickness from a small fraction of an inch to 6 ft. Areas without coal, locally called "wants," occur occasionally. They are irregular in shape and do not appear to follow any definite line. Many theories are advanced for their origin, one being that the coal was squeezed out by pressure, another that coal-forming vegetation never accumulated, and another that such material did form but was washed out.

The elevation of the coal bed at "Kingmine" portal is 8,000 ft. above sea level. The thickness of overburden varies from a few feet at the outcrop to 1,800 ft. under the high ridges. The coal seam dips to the south and west about 3 percent. For complete geology see U. S. G. S. Bulletin 819.

Mining Plan

The mining method in general consists of driving haulage entries to the north some 2,500 ft. apart, and cross or room entries 400 ft. apart. The room entries are driven N. 71° W. which results in a grade of about 0.5 percent in favor of loads, and causes all entries to drain to a central sump where all water is handled by a centrifugal pump of 500 G.P.M. capacity. Rooms are then driven at 100 ft. centers due north, and cross-cuts driven

Fig. 1. Shearing through center with a 7 A.U. Sullivan Cutter. A 3-man crew cuts and drills with same machine

Fig. 2. A 7 A.U. Sullivan combination cutter and drill. High speed drilling follows undercutting and shearing

at right angles 100 ft. apart, staggered. The pillar blocks are then split from the cross-cuts, and the top coal shot down and loaded on the retreat. Entry widths are 16 ft., cross-cut widths 20 ft., and room widths 25 ft.

Cutting and drilling are done by three-man crews operating 7 A. U. and C. L. U. Sullivan track cutters with high speed drill mounted on cutter. Places are undercut, sheared through center, and about six holes drilled on each side of shear followed by loading, tamping, and wiring (Figs. 1, 2. 3).

Fig. 3
Tamper wiring face after loading and tamping 6 holes on each side of shear

All blasting is done electrically, mostly from an outside switch after all men have checked out; but it is becoming increasingly necessary to break coal during the shift in order to properly advance development work and to quickly recover pillars in order to avoid squeezes and, in the interest of conservation, to effect a satisfactory recovery of coal. For on-shift blasting, the regular gelatine powder sheathed with compressed sodium carbonate has been approved after satisfying tests.

Each loading crew consists of one operator and one helper, operating an 11 B.U. Joy Loader (Fig. 4). The loader is serviced by two 8-ton combination storage battery-trolley locomotives, handling five 5-ton all-steel cars per trip (Fig. 5). As soon as a 5-car trip is loaded, a locomotive takes it to the main parting, the other locomotive coming in with five empty cars. This plan allows a loader to work at maximum capacity by reducing the time of car and trip change to a minimum.

Staggered Short Rail Section Effective in Track Advance

Since all cutting is done by track cutters, track has to be maintained within 12 ft. of the face. In room entries and rooms, 40 lb. steel is laid on 5 ft. x 5 in. x 5 in. native pine ties. The entry rail length is 30 ft., but the room rail length recently has been reduced to only 16 ft. As a room is advanced one cut, or about 8 ft., the track has to be advanced this distance. Sixteen ft. rails are ideal for the purpose. By having the joints staggered and using one 8-ft. piece, the track is advanced by pulling the 8-ft. piece, replacing it with a 16-ft. rail and moving the 8-ft. section to the opposite side. When 30-ft. rails were used in room entries, it was necessary to lay short pieces until a 30-ft. length could be layed. The new plan is an important improvement.

The main line track is of 60-lb. steel on 6-ft. x 6-in. x 6-in. ties. Fifteen-ton G. E. locomotives are used to pull 15-car trips. Main line motors take 15-car trips from district partings to the mine portal. A trip is then coupled to 1⅝-in. wire rope and lowered 6,700 ft. on an incline varying from 12 to 20 percent in grade. The hoist is of the regenerative type, the loads pulling the empties up and generating some power (Fig. 6). The service of hoisting ropes varies from 500,000 to a million tons.

The mine output of 2,100 tons per seven hours is produced by the necessary units each of which consists of the equipment and crew shown in the accompanying table.

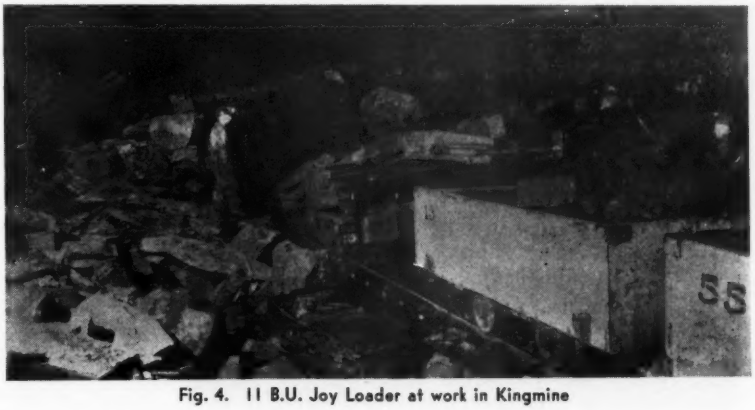


Fig. 4. 11 B.U. Joy Loader at work in Kingmine

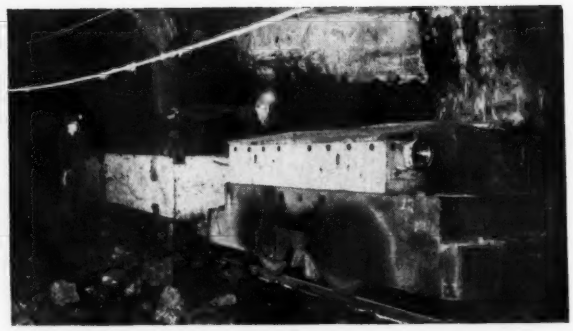


Fig. 5
Two combination trolley battery locomotives, handling five 5-ton all-steel cars, service each loader

Equipment and Crew for Each Mining Unit

1	Section Boss	
1	11 B.U. Joy Loader	2 Men
1	7 A. U. or C. L. U. Track Cutter, with Drill Mounted on Cutter	3 Men
	Track Men to Advance Room Track	2 Men
	Switch Laying and Track Recovery	2 Men
	Tamping	1 Man
	Timbering	2 Men
2	8-Ton Combination Battery-Trolley Locomotives	4 Men

This in brief describes the underground operation.

Preparation Plant Features Ultra-Modern Equipment

Washed, sized, dried, blended and waxed is descriptive of the product resulting from the modernized process incorporated in preparation of coal in this Kingmine plant (Fig. 7). Modernized by the McNally Pittsburg Manufacturing Corporation, the plant incorporates provisions for accomplishing every operation now considered as desirable in coal washing, sizing, dewatering, mechanical and heat drying, blending, dust-proofing, tramp iron removal, and ash reduction (Fig. 8).

Although erected on the site of the older plant during the summer of 1938, not much more than the basic structural steel and loading booms of that plant were used in the new plant. During the following summer three important additions were made. A Hardinge hydro-classifier now removes the minus 48-mesh waste from the 0 x 3/16-in. size. A Link-Belt Roto-Louvre dryer (Fig. 9) further dries the 48-mesh by 3/16-in. size, and an Eimco multiple disc filter handles the minus 48-mesh refuse from the sludge tank.

Six tracks serve the plant which has a capacity of 300 tons per hour, or 2,100 tons per 7-hour shift. Four basic sizes are prepared: 10-in. lump, 3 x 10-in. stove, 1⅝ x 3-in. nut, and 1⅝-in. screenings. A re-screening and blending plant classifies and re-blends the minus 1⅝-in. coal. Conveyors from the re-screening to the main plant provide for return of slack to be re-mixed with prepared sizes when so ordered. One-in. slack, 1-in. stoker coal, and 1⅝-in. slack are blended in desired percentages in the blending plant. Special sizes, such as 1⅝-in. lump, 3-in. lump, and 1⅝ x 10 in., are prepared by minor tipple adjustments.

Dust within the enclosure is kept to a minimum by a dust collecting system with hoods at all locations where appreciable dust is formed. Cloth filter bags collect the dust, thence it is hauled by truck to the refuse dump.

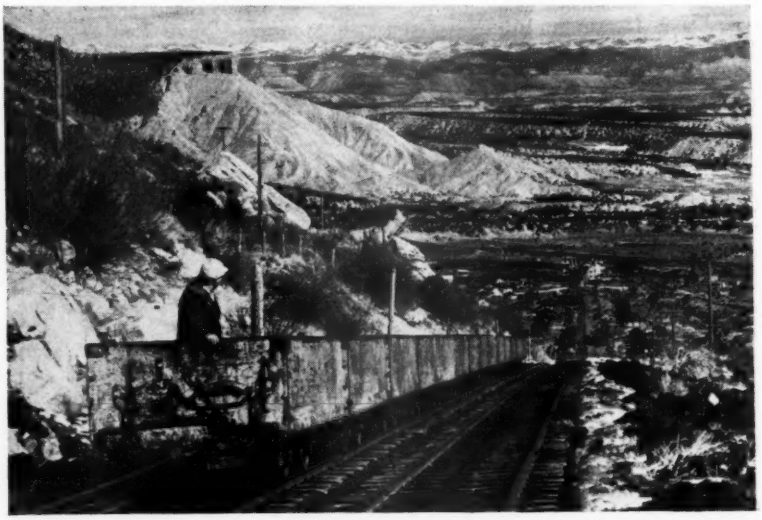


Fig. 6. Empty trip nearing portal while loaded trip approaches tipple. Hoist is regenerative type

Fig. 8
Modernized Kingmine preparation plant, where coal is washed, sized, dried, blended and waxed

Dustproofing Features "Waxolizing"

Dustproofing is mainly accomplished by "Waxolizing," occasionally by oiling industrial slack coal. Treating units and the central waxing and oiling plant are of Viking manufacture. A closed circulating system using heated light oil in brass tubing keeps the lines at temperatures sufficiently high to permit free circulation of the wax. Heated wax is drawn off a closed circuit at the treating hoods, the amount in the system being kept constant by drawing from two reserve tanks each with a capacity of 5,000-gallons. Steam is utilized to heat the circulating oil and wax. Oil treating lines parallel the wax lines leading to treating cabinets which are entirely

Fig. 9. 3/16" x 48 mesh coal is dried in this Link Belt Roto-Louvre drier

enclosed by Viking sectionalized metal curtains (Fig. 10). The curtained cabinets prevent escape of atomized wax or oil. Cabinets in which prepared sizes are waxed are steam heated to effect a good job of waxing. Commendable results are thus accomplished in the dustproofing of "Utah King Coal."

Twelve Sturtevant heating units maintain a moderate temperature within the main plant and the re-screening plant during the winter months.

Crushing and Screening Plan Permits Maximum Recovery of Marketable Coal

Mine run is delivered to the rotary dump in 5-ton all-metal cars. Fifteen cars, or 75 tons, of coal are delivered per trip. Cars discharge into a 15-ton hopper, the feed from which is controlled by a plate feeder driven by spur gears to an adjustable-throw crank. A triple-speed motor on this drive widens the control of feed to meet quality and demand schedules. Because of the height of the seam and the nature of the coal, large lumps are delivered to the tipple, necessitating the use of a breaker. Mine run from the hopper is crushed in a McNally-Pittsburg double-roll adjustable breaker crushing to 12, 14, 16, or 18 in., depending on the size lump desired. Discharge is onto a 72-in. belt conveyor inclined 18 degrees and traveling 200 ft. per minute. A Stearns magnetic pulley removes tramp iron on the discharge end of this belt which delivers the mine-run onto a pair of 7 ft. wide shaking screens. These screens are supported by metal hangers and have a 6-in. throw.

Three separations are made on the main shaker—minus 5 in., 5 x 10 in., and plus 10 in. Prepared sizes discharge onto shaking picking tables supported from beneath by ash boards (Fig. 11). Degradation screens at the top sections of the tables remove breakage and undersize pieces. Dustproofing waxing hoods are placed at the lower ends of the tables from which point the coal is delivered to the loading booms. A mixing conveyor between the picking table and booms permits blending slack and prepared sizes, also delivery of coal to local sales and railroad bins. A cross conveyor at the discharge end of the booms conveys coal to box car loaders or to a Jeffrey 36 x 48-in. Flextooth crusher where prepared sizes may be reduced to slack. On the discharge chute of the crusher are found magnet sections for tramp iron removal before the coal is conveyed to the re-screening plant for classification and blending.

When lump coal is not desired, a door is raised at the lower end of the primary shaker lowering the lump by chute into a Jeffrey 36 x 36-in. single-roll crusher which breaks it down to 10 in. or as small as 3 in. if desired. By elevator and belt conveyor this crushed lump is returned to the primary breaker just under the mine-run feeder plate, thence over the main shaker screen, which permits the 5 in. to be washed. Pickings from both tables are disposed of in a refuse conveyor and bin or by chute into the aforementioned Jeffrey crusher for pieces which contain streaks of bone. This setup permits maximum recovery of marketable coal. Refuse is trucked from the bin and dumped.

Illumination on the picking tables is by Westinghouse units, each a mercury-vapor bulb, and three 100-watt incandescent bulbs in a reflector. Three such units are installed over the 5 x 10 tables, and one over the lump

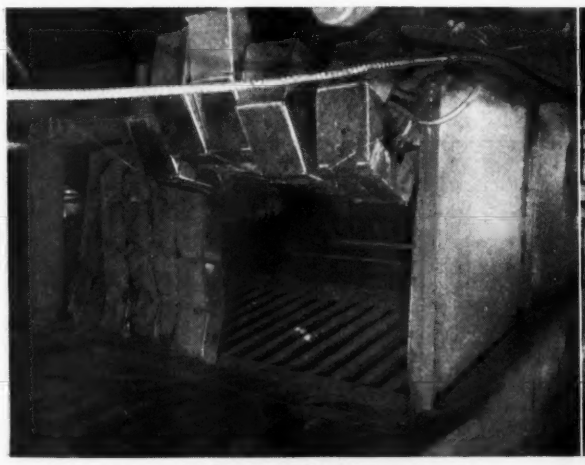


Fig. 10. Grizzly bars at bottom of wax hoods

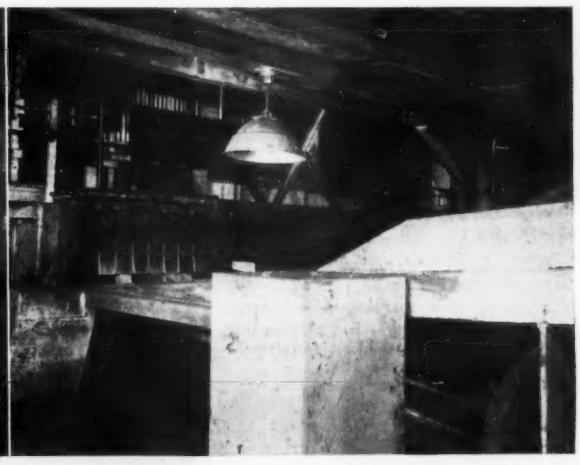


Fig. 11. Prepared sizes discharge onto shaking picking tables supported by ash boards—above, the lump picking table

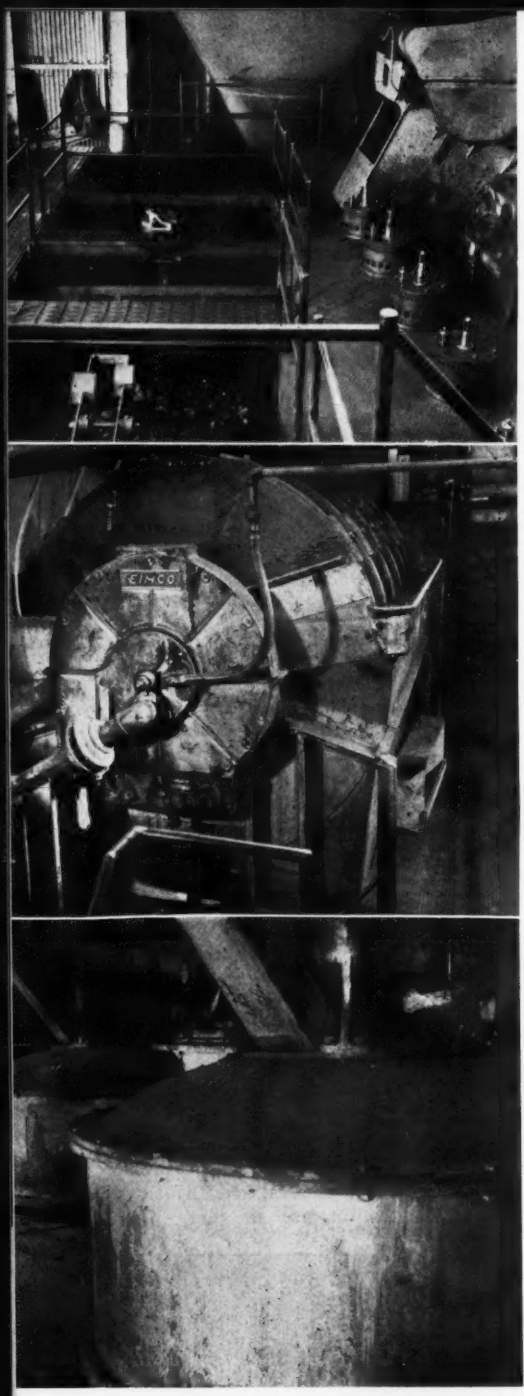


Fig. 12. McNally-Norton Automatic Coal Washer of 250 tons per hour capacity

Fig. 13. Coarsest and heaviest particle from minus 48-mesh material are dewatered in this Eimco filter

Fig. 14. Top view of Carpenter Centrifugal Dryers, showing feed chutes

tables. A platform over the lower shaker facilitates removal of large pieces of wood and metal when the lump is crushed in the Jeffrey single-roll crusher.

Washing the Coal

Minus 5-in. screened and crushed coal from the single-roll Jeffrey is carried from the shaker to the washbox by a 42 x 20-in. gravity-discharge bucket elevating conveyor making a lift of 22 ft. Discharge is into two launders equipped with liner plates to resist abrasion and fitted with a vane operating controls for shutting off the air flow to the washbox when the flow of coal ceases. This feature prevents the loss of the bed by intermittent feed of coal.

Capacity of the McNally-Norton Automatic Coal Washer is 250 tons per hour (Fig. 12). It is of 5-compartment design with automatic reject controls and the air receiver placed beneath the washing room floor. Air is supplied by an Ingersoll-Rand blower. A screen just into and above the water collects the wooden chips from the box.

Water to the washbox is supplied from a conical tank maintaining a 16-ft. head. A centrifugal pump driven by a 100-hp. motor supplies 4,000 gallons of water per minute to the conical tank, pumping from the sludge tank. About 35,000 gallons of fresh water per shift, added to the circulating water circuit, prevents excessive buildup of solids in the water to the washbox. The water supply for the plant is from three 50,000 gallon tanks, giving a storage capacity of 150,000 gallons, this being pumped from the mine. Waste water of 35,000 gallons per 7-hour shift is pumped into settling ponds.

The primary refuse elevator at the feed end of the washbox discharges by chute into the refuse conveyor, thence to the bin. Middlings refuse from the elevator at discharge end of the washbox feeds onto a shaking screen with a section of small holes for removing the fines. This through product goes directly to the refuse conveyor. Oversize material, depending on the operators' judgment, goes either through a door to the refuse conveyor or over the door to a 24 x 24-in McNally-Pittsburg single-roll crusher to be broken to slack and returned to the washbox feed.

Sizing and Blending

Discharge from the washbox is by launderer to a pair of 6-ft. classifying screens supported from above by ash board hangers. Four sizes result from this screening: 0 x 3/16 in., 3/16 x 1⅝ in., 1⅝ x 3 in., and 3 x 5 in. The latter size is blended with the 5 x 10 in. on the picking table to make 3 x 10-in. stove coal. When crushing is necessary this as well as other sizes may be crushed in the single-roll Jeffrey crusher or in the Flextooth crusher. Nut coal (1⅝ x 3 in.) passes by chute from this classifying screen through the wax treating hood to the boom. When this size is not loaded or blended, it is crushed to slack in the Flextooth crusher. These two larger sizes over the classifying screen are not heat dried, being dewatered by drainage on the classifying screen after passing under fresh water sprays, which is sufficient for these sizes.

Screens and Heat for Dewatering

Leaving the classifying screen the 3/16 x 1⅝-in. coal passes over a Selectro vibrating screen chute for further dewatering and final removal of minus 3/16-in. material. By sloping flight conveyor this coal is delivered to a 40-ton surge bin, thence by plate feeder into a Vissac dryer which consists of two high-speed screens of stainless steel wedge-wire. The drive is at 200 r.p.m.

(*Continued on page* 42)

Fig. 15
Plate feeders (right) for blending at re-screening plant

SAFETY IN RAISE MINING*

● *Special Set of Rules Worked Out by Oliver Iron Mining Company Officials Expected To Prove Very Effective in Reducing Accidents in Raising*

By W. P. WOLFF
Chief Mining Engineer
Vermilion District
Oliver Iron Mining Co.

THE importance of raises in underground mining needs little comment. Raises are used in every underground mining system employed on the Lake Superior iron ranges and are common in mining operations all over the world. This is true in spite of the fact that they are generally believed to contribute many of the hazards of underground mining.

Statistics do not show that the occurrence of accidents in raising or raises is any greater than in stoping operations. There are possibly two reasons for this: first, the obvious danger around raise openings engenders extra care on the part of the workmen; and second, none but experienced and careful men are allowed to work in raising operations. However, these factors alone are not sufficient in keeping down raise accidents. They must be supplemented by a code of raise procedure that will be followed by those doing this kind of work.

The General Safety Committee of the company, following its fixed policy of dealing energetically with accident hazards, appointed a special committee to examine this one matter. Five men were named on this committee, one from each district in which the company operates underground mines, and they were instructed to study accident causes, to inquire into the whole subject of raise hazards, and to formulate a set of standard regulations designed to reduce those hazards.

Because varying ground conditions had resulted in the existence of different methods of driving raises and different rules for protecting men from the danger of raise openings in each locality, it was evident that the committee would first have to combine the present practices of each of the 10 mines into a single set of rules that would fit all of them, and then make any additions found necessary. Although some of the existing methods and rules were common to all districts, others were peculiar to single districts and even to individual mines.

After several months of study and discussion of all of the problems involved, including the two obvious hazards that account for nearly all raise accidents—falling men and falling objects—and other hazards such as ventilating conditions and the use of explosives, the committee finally drafted a code of rules. This code has safety as its first and only consideration, and makes no concession to cost. Its aim is to make the working face of a raise and all of the conditions about a finished raise at least as safe as a drift or stope, or any other part of a mine.

Two Construction Compartments for Raises Over 25 Feet High

The code comprises a group of 20 general rules that apply to all raises, and in addition a smaller number of special rules that cover the specific conditions found in different types of raises and in the repairing of raises. The most drastic departure from existing practice is in the first rule that provides: "All raises over 25 feet in height, while under construction, shall have *two* compartments, one a 'service compartment' for ladders, piping, service cage, etc., and one a 'chute compartment' for broken material." Thus all raises in which the element of height offers a hazard must be driven with a separate compartment for ladders on which the miners may approach the working face in complete safety.

Service Compartment Covered At All Times

The second rule provides that the ladder or service compartment shall be kept covered at all times, either on top of the last set of cribbing when blasting, or at a reasonable distance below, the cover to serve as a platform when men are working at the top of the raise. It is specified that the cover shall be of a single course of 6-in. cribbing, or of 3-in. plank. It must be heavy enough to resist damage from blasting and to support drilling machines. Thus the first rule provides against falls of men by requiring safe ladderways, and the second against falls of material by requiring substantial cover over these ladderways.

Rules 3 and 4 provide for the installation of ladders and sollars. Ladders are to be installed all the way to the working platform as the raise progresses. Since ladders are usually supplied in 16-ft. lengths, this requires that short ladders be kept at the top of the raise to span the distance from the last full length to the working platform. Inclined raises may have continuous ladders, and they must have sollars spaced not more than 25 ft. apart. Vertical raises are to have ladders staggered or offset, and supported on sollars spaced to fit standard ladders, or not more than 15 ft. apart. Here again are provisions against falls of men.

Two rules require that an opening be provided in the raise partition just below the cover, to permit access to the heading through the chute compartment, and that a safety platform be built in the chute compartment opposite this opening. These provisions are aimed at the all too common practice of allowing all the broken material on the ladderway cover to fall down the ladders when the miners open the cover on their return after blasting.

Two rules providing that cross poles used for staging must be inspected after every blast, and that men working below stagings must wear safety belts, are merely statements in the code of regulations that were generally being observed.

* Presented to Lake Superior Mine Safety Conference, Duluth, Minn., June 20, 1940.

Use of Respirators and Wet Drills

Three rules are devoted to ventilation. One of these concerns raising in rock, and provides that when drilling miners shall wear air-line respirators, and thus be provided with air completely free from dust. It also provides that approved face respirators be worn in other operations in rock raises. The second rule requires approved face respirators to be worn in all operations in ore raises. The high dust count in these raises makes the use of respirators necessary, but the amount of free silica in the ore dust is too low to require air-line respirators. The third of these regulations requires that in drilling in rock raises only "wet" type drills shall be used, the object being, of course, to keep down the dust in the air.

Two rules cover the matter of blasting. The first provides that when blasting above the height of 50 ft., electric delay caps shall be used, and that the usual precautions of short-circuiting wires to guard against stray currents, and the correct arrangement of blasting switches, shall be followed. Below a height of 50 ft., fuse and caps may be used, but in such cases the minimum length of fuse shall be enough to provide 4½ minutes burning time. This stipulation is based on the fairly standard practice of using 7-ft. fuses in raises, which length allows 280 seconds burning time. The second blasting rule provides that when a raise heading is within 20 ft. of its objective, guards must be stationed at the time of blasting to keep men away from the holing-through location.

Ropes for Hoisting Tools and Materials

A rule requiring all tools and construction materials to be hoisted or lowered with ropes is aimed against the falling object hazards that accompany the all too common practices of carrying tools up ladders (leaving only one hand to climb with), and of throwing drill bits and steel down the raise. Rope sizes for this purpose are specified as not less than ¾-in. hemp or ⅜-in. wire rope, and it is recommended that a power hoist be used.

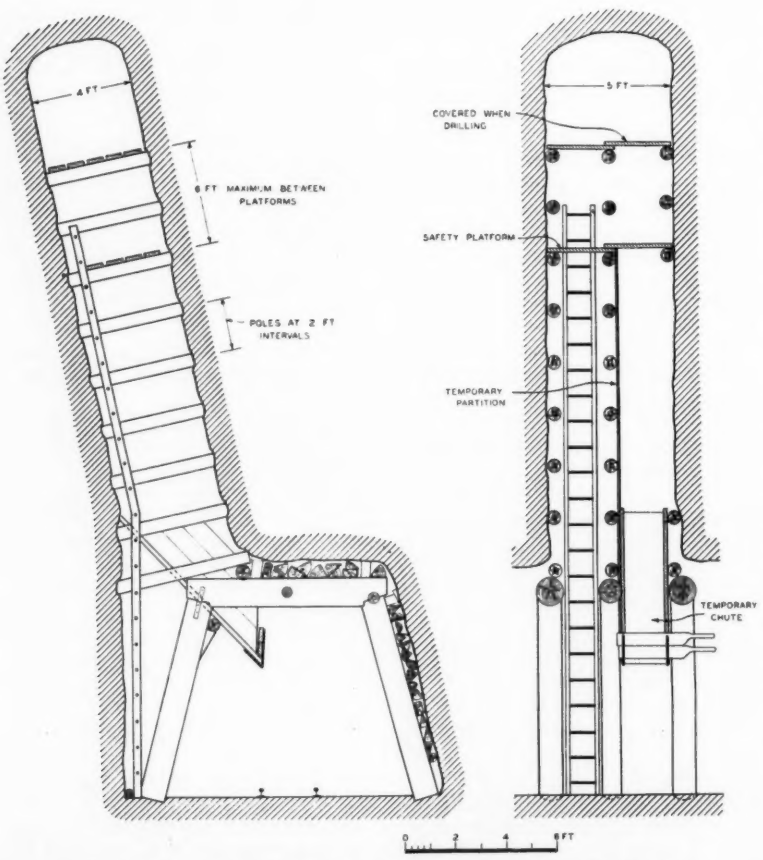


Fig. 1. Raise mining practice for single compartment uncribbed raise

Another rule requires the use of a suitable signaling device after a raise has reached a height of 50 ft. The type is not specified, but is left to the district practice. Speaking tubes, whistles and electric lights are regularly used, and under proper conditions are satisfactory.

When raises are being driven or repaired from motor-haulage drifts, it is required that red lights be displayed nearby to warn all traffic. This serves the double purpose of protecting passing persons from falling material and of protecting raise miners against fast-moving cars and locomotives.

A rule that requires all raise headings to be inspected by the shift boss at least once during each shift is designed to "put teeth" into the code. It places the responsibility for raise safety where it is most effective—with the foreman.

Guarding Tops of Finished Raises

Three rules provide specifications for guarding the tops of finished raise openings. The first of these specifies that raises used as ladderways shall have sollars at the top, that the sollars shall have openings for the ladders, and that these openings shall either be covered with hinged covers or protected with toe-boards extending at least 4 in. above the sollar. Both sollars and ladderway covers may be made with wire screens to favor ventilation, provided toe-boards are installed to give the desired protection against falling chunks. Ladders must extend at least 3 ft. above sollars, or hand-holds must be provided to that height.

The rule concerning raises used as ore chutes provides that they shall be protected at the top with steel grizzly bars spaced not more than 1 ft. apart. This, of course, is to keep men from falling in. Raises in hard ore mines, which are generally kept nearly full of ore—so that the falling hazard is not great—may have larger openings. Raises used for handling broken rock, the coarse character of which prevents the use of grizzlies, are required to have their top openings enclosed with fences, and bars or gates, which are kept closed at all times except when rock is being dumped, in order to keep persons from inadvertently walking into them.

Special Rules for Different Types of Raises

The foregoing set of rules covering general raising conditions needs to be supplemented by only a few specific

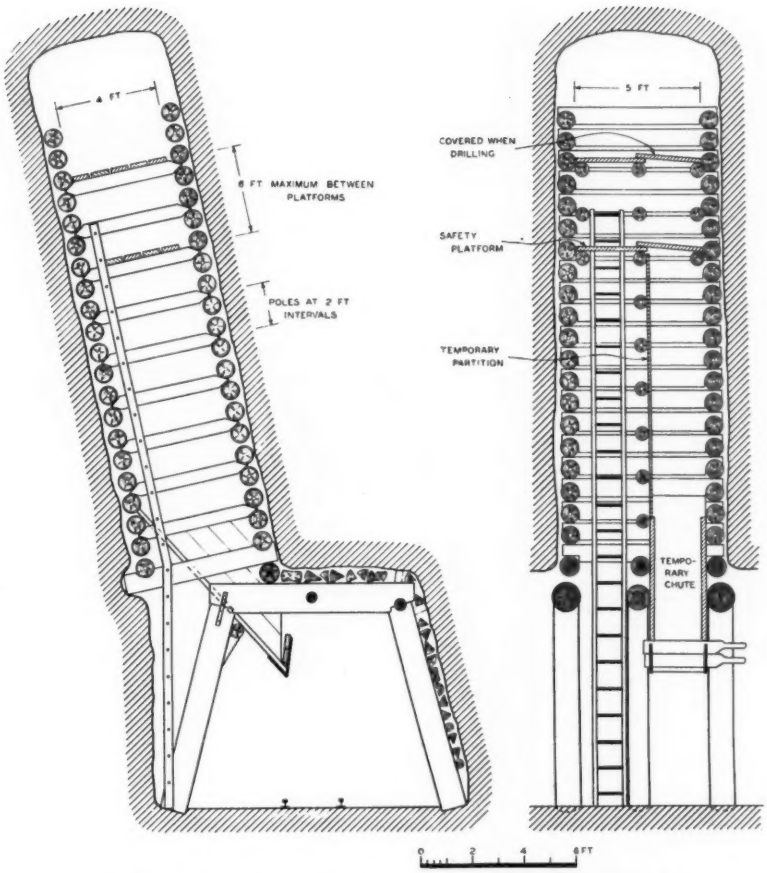


Fig. 2. Raise mining practice for single compartment cribbed raise

rules for different types of raises. Those rules applying specifically to single compartment uncribbed raises are illustrated in Fig. 1. Raises of this description are put up in hard rock and are used as ladderways, supply raises and rock chutes. If such a raise is finally to become a ladderway or a supply raise, the partition, ladders, poles and sollars are all rearranged when the raise is finished. If it is to be used for a rock chute, then all the lining material is removed when it is finished. Thus the lining material shown in the illustration is all more or less temporary and is only adapted to the actual raising operation.

The rules require that these raises shall have a rectangular cross-section and be not less than 4 by 5 ft., so that two compartments—each about 2½ by 4 ft.—will be available. The cross poles are to be not smaller than 5 in. in diameter and spaced at 2-ft. intervals vertically. The temporary partition is to be made of plank or boards. These may be 1-in. boards if it is possible to keep the broken rock compartment nearly full. If it is emptied during each cycle of operations, then heavier plank must be used. Cross poles, ladder and partition must be put in as the raise progresses, and the partition should never be less than 8 ft. below the top set of cross poles.

Fig. 1 shows the ladder in place, and the partition, the safety platform and the working platform in place as they should be while drilling is going on. When blasting and cleaning out broken rock, the platforms are taken out of the chute compartment. The opening from the ladder compartment, required by the general rules, is provided by leaving the partition out on the last set or two of poles.

Fig. 2 illustrates the requirement for single compartment cribbed raises such as are commonly used for ore chutes. Normally, the partition and sollars are temporary and are taken out when the raise is finished. Partitions, ladders, sollars, covering, etc., are similar to those for single compartment uncribbed raises. The partition is built on sprags secured between the cribbing.

An additional provision is made that when raising in soft or treacherous ground, head-boards supported on cross poles or props shall be installed. These shall be maintained in place during cribbing, drilling and charging operations, and removed just before blasting.

Double Compartment Cribbed Raises

Double compartment cribbed raises consist of two adjacent compartments each cribbed separately, one compartment being used for service and the other for broken material. Both compartments are excavated and cribbed at the same time, when the character of the ground permits. When the ground is soft or treacherous, each compartment is excavated and cribbed separately not more than 2 ft. at a time. Under such conditions, head-boards must be used to support the back, just as in the case of single compartment raises.

Two sets of staging must be maintained in the service compartment, one to serve as a working platform and the other, about 6 ft. below, to serve as a safety platform. Whenever it is possible, the chute compartment is kept nearly full of broken ore, and a working platform is built over the top of that compartment for men to stand on.

Fig. 3 shows the principal features of an inclined double compartment raise. The longitudinal section and one vertical section show the arrangement of the safety platform and working platforms when men are working at the top of the raise. In this case, the use of stage rails pointed at the ends and wedged between the cribbing is illustrated. This is one of the approved ways of building raise platforms. The use of a timber cage for hoisting supplies and tools, and a small hoist in conjunction with it, is shown. A top view of the raise illustrates the way in which the service compartment is covered during blasting. A second vertical section shows the same thing as well as the triangular opening left between the compartments to give the men access to the heading after the blast.

Fig. 4 illustrates an approved way of driving a double compartment cribbed vertical raise. In this case, the service compartment is 5 by 5 ft. inside cribbing and is divided by a temporary partition to provide a temporary chute compartment through which some of the broken material is handled and through which all supplies are hoisted. Shown in the diagram are the cover over the ladderway, which is maintained at all times, and

the working platforms and safety platforms that are kept in place while men are working in the raise and removed for blasting. The use of a fan tube for ventilating the top of the raise is also illustrated. Two- and 5-hp. high-speed fans are used to supply air for this purpose. The ladders are shown in "staggered" position.

Rules for Repairing Raises

The specific rules for repairing raises are few. The first and most important provides that when a raise is to be repaired the collar and the ground around it shall first be made secure against caving; then, after a thorough inspection to determine the safest way to proceed, all loose material must be cleaned out of the raise opening. Miners are required to wear safety belts while inspecting and cleaning raises and when repairing them from the top downward.

In a majority of cases, raises can be repaired safely from the bottom upward. When this is to be done, the top of the opening must first be covered securely. All the work must be done on a staging of sound plank supported on poles. Not more than 6 ft. below this work staging, a safety staging of similar construction must be maintained.

Finally, the rules stress good housekeeping, with an admonition to keep sollars clean, to keep tools stored in an orderly manner, and to observe the required precautions in hoisting and lowering tools and supplies.

Unfortunately, mere rules cannot eliminate the dangers caused by human fallibility, but these dangers are also being reduced to a minimum by allowing no one but specialists, or at least men of proven ability and physical fitness, to work in raises.

As might be expected, the institution of such extensive regulations necessitated in a few cases some rather radical changes in raising practice, but nevertheless the new rules were gladly accepted by our various operating organizations, even when it was felt that the necessary changes would be expensive. In general, we found that the rules were welcomed by everyone in the interests of safety.

Urgent Need for Greater Safety in Blasting

The most notable problem remaining to be solved before raising can become as safe as desired is the matter of greater safety in blasting. The provision for electrical blasting in raises above a height of 50 ft. is a sound regulation. It was already the fixed practice in all the mines of our company, and in some of them all raise blasting after the first round was done electrically. However, in nearly all mines, when blasting is done with electric caps, there is an ever-present danger of premature blasting through stray currents, even though all the normal precautions are taken. Master fuse lighters with fuse have been tried, but in firing any considerable number of holes they introduce complications that make them undesirable. Ignition Cord, a new product developed recently for lighting fuses, seems to have a great deal of merit for raise blasting. With the explosives manufacturers directing attention to this problem, we may hope that it will soon be solved.

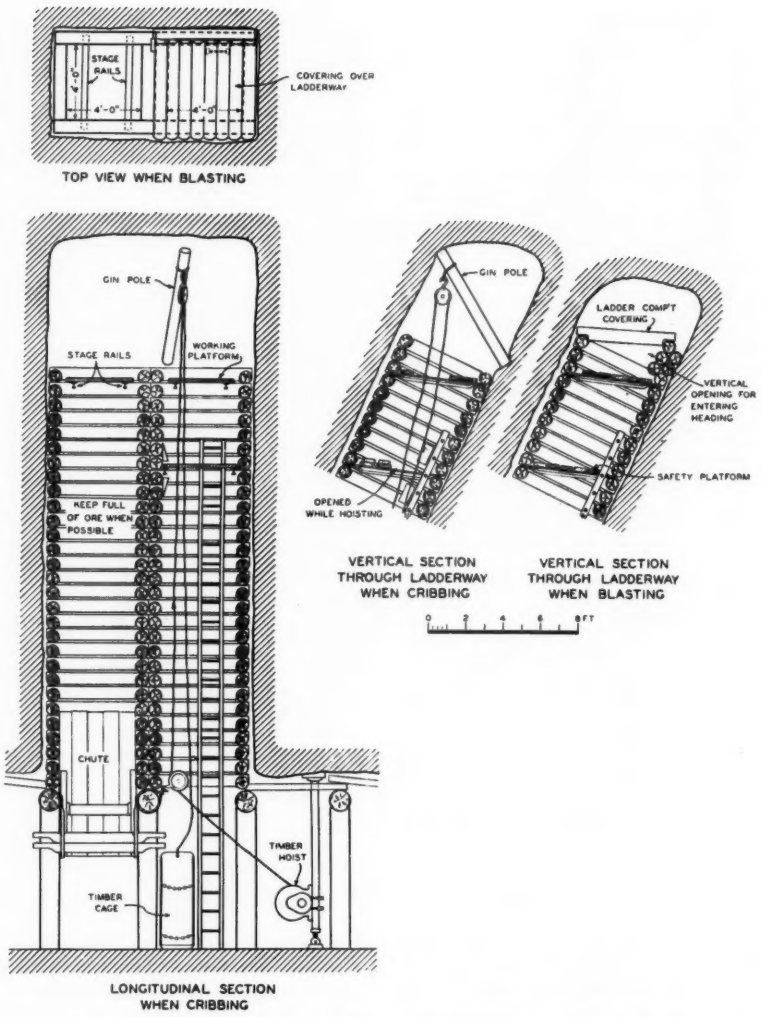


Fig. 3. Mining practice for inclined, double compartment, cribbed raise

A mechanical device recently patented may find application in electrical raise blasting. It consists of an armored electric switch to be located at the heading to be blasted and operated from a safe distance by compressed air. The switch keeps both blasting leads and power leads short-circuited until time for firing, when the short-circuits are opened and power and blasting leads connected by the opening of an air valve.

Minimizing Number of Raises

In conclusion, it might be well to mention that the best way to eliminate raise dangers is to eliminate raises. This can be done more or less completely in any mine having an orebody in a single thin horizon that may be mined entirely on one elevation.

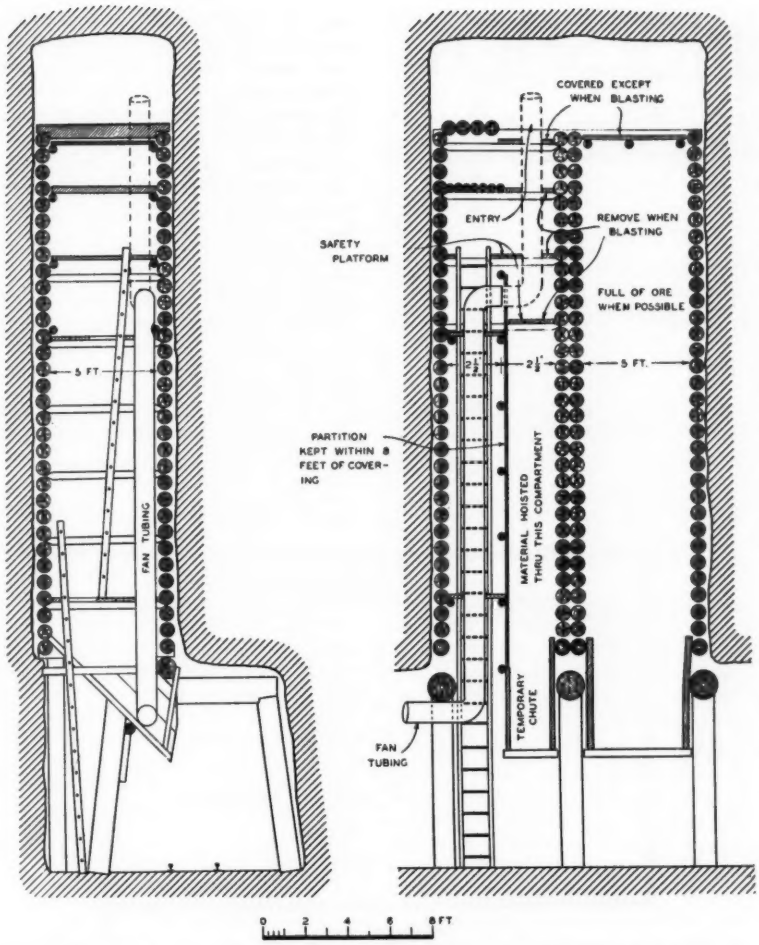


Fig. 4. Raise mining practice for vertical, double compartment, cribbed raise

For deep mines with ore-bodies of great vertical extent, raises are, of course, necessary, but even in these the choice of mining methods and attention to planning may do much toward reducing the number of raises and their attendant dangers. Sub-level caving with cross-haul slushing offers a decided advantage in the small amount of raising it requires. Top-slicing and sub-level caving without secondary slushing require rather a large number of raises. Block-caving requires even more; and chute-caving, the method formerly used in the Vermilion district and now used in some copper mines in the Southwest, demands a great deal of raising. It is true that natural physical conditions usually determine the method of mining, but in any case efforts should be made to plan development so that the number and the length of raises are kept down to a minimum.

Just how effective this attempt to take the danger out of raises and raising will be, time and experience alone will tell. From present indications, however, good results are expected, and, in any event, we feel that the objectives merit the effort required to attain them.

Beneficiation of iron ore in Minnesota in 1939 comprised 48.6 percent of the total ore produced in the state. Percentage of ore beneficiated amounted to 2.3 percent in 1910, 11.2 percent in 1917, 35.3 percent in 1925, 42 percent in 1936 and 43.2 percent in 1938. Beneficiation is defined as washing, jigging, crushing, drying, sintering or any process by which grade or structure of the crude ore is improved.

Mineral Industries Building for West Virginia University

On May 6 the Board of Public Works announced the release of $500,000 for the construction of the new Mineral Industries Building at West Virginia University. This building, which will house the School of Mines, the West Virginia Geological Survey, the Geology Department and the Chemical Engineering Department, has been under consideration for some time.

Plans are now being developed by the architect calling for a building to be 72 ft. wide, 310 ft. long and five stories high. This building will greatly increase the facilities for both instruction and research in the field of mineral industries and will house excellent laboratory facilities for research of coal and related fields as well as enable greater service to the coal industry by the Mining and Industrial Extension Department. It is planned to get the construction under way early this fall.

Combined Metals To Construct Mill

Marking the beginning of a new period of expansion and development in the Pioche district of Nevada, Combined Metals Reduction Company planned early in July to begin immediate construction of a 450-ton mill at the Caselton shaft of the company's mine, seven miles from Pioche. Plans were announced by E. H. Snyder, of Salt Lake City, vice president and general manager. Cost of the mill will approximate $600,000 and it is expected to be completed early in 1941.

The mill will treat complex lead and zinc ores from the Combined Metals Reduction mine and the Prince Consolidated mine, located about 1½ miles from the Caselton shaft. Combined Metals has a large interest in the Prince Consolidated Company.

At present the Combined Metals mine is shipping about 10,000 tons of lead-zinc ore monthly to the Bauer, Utah, mill. The new mill at Pioche will treat all this ore in addition to that from the Prince Consolidated.

Besides ore of the type now being shipped to Bauer, there are large ore reserves in the mines which could not be shipped profitably to Bauer for milling, but which can be put through the new mill, Mr. Snyder stated. Announcement was also made that the capacity of the Bauer mill was to be increased from 17,000 to 20,000 tons per month by completion of the installation of a new unit.

The new mill will be served by a spur track of the Union Pacific railroad. The Union Pacific recently took over the old Prince railroad between the Prince mine and Pioche, a distance of about eight miles, and has started reconditioning this line with heavy rails. In addition, the railroad will construct 3½ miles of new road from the old Prince line to the site of the new mill. This work, estimated to cost approximately $250,000, will be completed in about 2½ months.

THE FLOATING SHOT

● *As Applied to the Use of Permissible Explosives in Blasting Down Coal*

By JAMES M. GODWIN
Chief Mine Inspector
Pocahontas Land Corporation

THE chief objective in blasting down coal is to obtain a maximum of larger sizes of firm structure and corresponding minimum of fines or slack sizes, at minimum cost and maximum of safety. Explosives usually used are black powder or permissible explosives.

Black Powder (Figure 1)

Black powder is fired by ignition, and the gases are generated progressively as the burning spreads through the charge. We are told that black powder has a velocity of detonation of about 900 ft. per second; that the coal starts moving about 1/3,000 of a second after the ignition; and that a peak explosive pressure of from 40,000 to 60,000 lb. per sq. in. is reached about 1/2,000 of a second after the ignition. As the coal starts moving before the peak pressure of the expanding gases is reached, part of the explosive force exerts a heaving out effect, and there is thrown out from the face a large proportion of the larger sizes of coal, of firm structure, that stand handling with a minimum of degradation. Any partings of slate or other foreign matter are also thrown out in large pieces and can be readily removed. Over shooting may cause smaller sizes but does not cause shattering or pulverizing of the coal and partings.

For these reasons it has been generally conceded that black powder is the best explosive for producing a satisfactory product as regards sizes and breakage. But for various reasons not necessary to enumerate here, state and Federal governments have from time to time placed increased restrictions on the use of black powder in coal mines, until now its use is banned in all gaseous or dusty coal mines and is frowned upon in all coal mines.

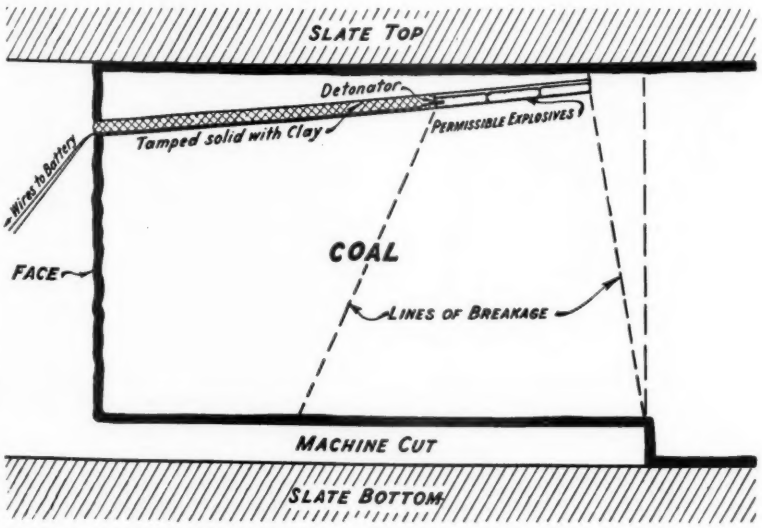


Fig. 2. Permissible shot

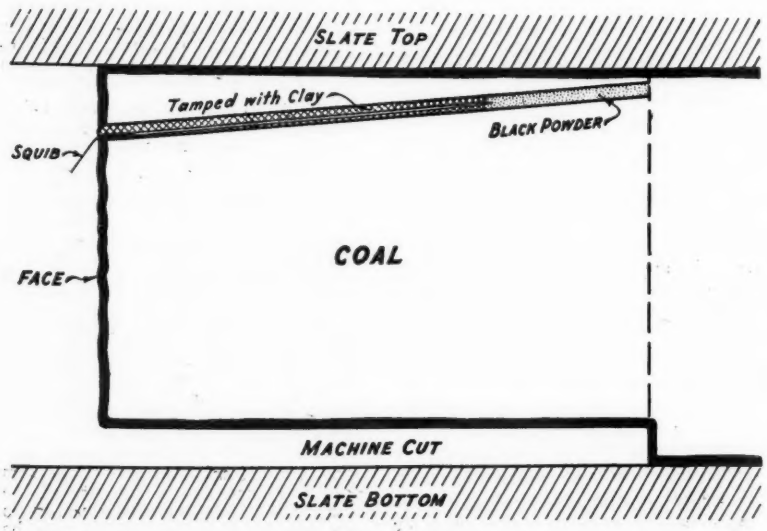


Fig. 1. Black powder shot

Permissible Explosives (Figure 2)

To replace black powder we now have other explosives which, when they have met certain rigid tests of the U. S. Bureau of Mines, are termed permissible explosives.

Permissible explosives are fired by detonation. We are told that they have a velocity of detonation of from 4,800 to 6,200 ft. per second (as compared with 900 ft. for black powder), and that a peak explosive pressure of from 100,000 to 125,000 lb. per sq. in. (as compared with 40,000 to 60,000 lb. for black powder) is reached in about 1/10,000 of a second after detonation (as compared with 1/2,000 of a second for black powder). As the coal does not start moving until about 1/3,000 of a second after the explosive is detonated the peak pressure of the expanding

gases is reached some time, comparatively speaking, before the coal starts moving, with the result that in common practice of tight tamping, there being no provision for expansion, the excess pressure must be absorbed by the coal. This causes coal and any partings to be badly shattered or pulverized in the vicinity of the charge and to a lesser degree in much of the coal brought down, resulting in difficulties in cleaning and much degradation in handling. If the charge is placed near what would be the face of the next cut the solid coal of the next face will be similarly affected. If the coal should be overshot the shattering and pulverizing of coal and partings and degradation in handling increase accordingly.

The Cushion Shot (Figure 3)

To reduce the shattering and pulverizing effect of the permissible explosive as ordinarily used, many mines have adopted the practice of providing an air space or air cushion at the outer end of the charge to absorb some of the excess pressure of the initial explosion and delay the time of reaching the peak explosive pressure.

Powder companies have recognized the advantages of this air cushion in the use of permissible explosives. One powder company states in its handbook as follows:

"With permissibles in coal that is hard to shoot the hole should usually be tamped solidly, but when this method of loading a permissible pulverizes the coal at the back, airspacing should be tried if allowed by law. Various means of securing airspace are employed, separately or in conjunction with each other."

Another powder company states in that part of its handbook with reference to the blasting of coal as follows:

"There had been two general methods of securing a high percentage of prepared sizes. One method was the use of black blasting powder which exerted a slow heaving effect on the coal breaking it in large lumps but having obvious disadvantages.

"The other method was cushioned blasting with permissible. This method secures the slow spreading effect by leaving sufficient airspace in the hole to cushion the initial shock or by compressible stemming."

The principle of the air cushion is readily illustrated in the use of the "dobie" or "mud cap" shot where a stick of dynamite or permissible explosive placed on a piece of slate will on being detonated shatter the slate. But if the explosive is supported in such manner as to leave an airspace about the thickness of a lead pencil between the explosive and the slate the force of the explosion will not shatter the slate.

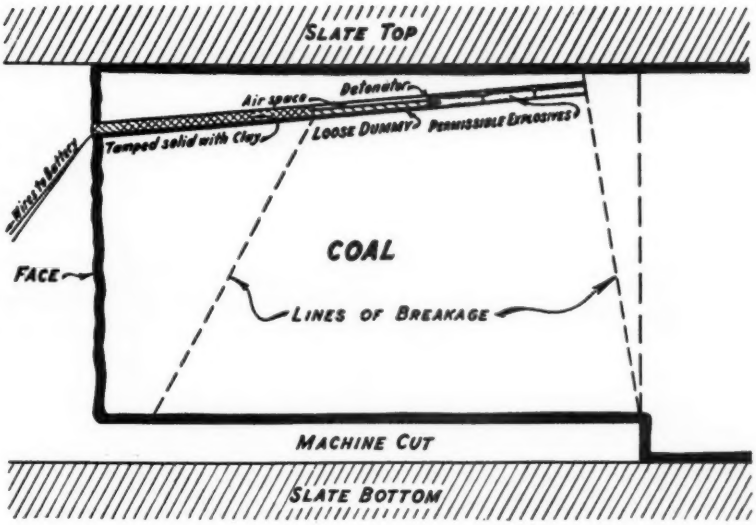


Fig. 3. Air cushion shot

The Floating Shot (Figure 4)

Similarly the advantages of the air cushion are enhanced and the shattering and pulverizing effect of the permissible explosive further reduced by providing an air cushion at each end of the charge, and having the hole of such size, and supporting the charge in the hole in such manner, that the charge is entirely surrounded by air and is practically floating in air, hence the term "floating shot."

Experiment has demonstrated that still further advantage is obtained by placing the detonator at the end of the charge facing the bottom of the hole, on the theory that the explosive action will be progressive and that the peak pressure of the explosion will occur well out over the kerf, and thus taking advantage of same and require less explosive to break down the coal.

For the "floating shot" the diameter of the holes should be about ¾ in. greater than the diameter of the explosive. Place a card board or fiber ring on each end of each stick of explosive to support the explosive in the hole and prevent contact with the coal, the outer diameter of the card board or fiber ring being about ½ in. greater than the diameter of the explosive. Place the detonator at the end of the charge facing the bottom of the hole; insert the additional explosive required, each stick or part of a stick being also fitted with sup-

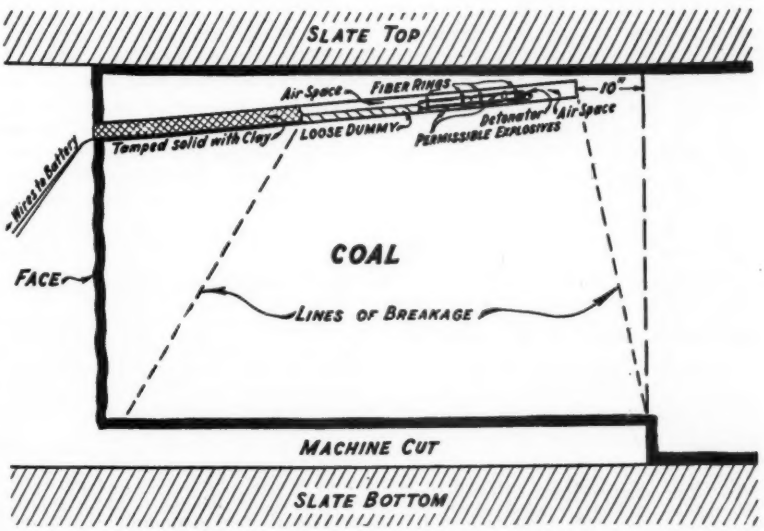


Fig. 4. Floating shot

porting rings, and shove the entire charge to the bottom of the hole. Then with the detonator wires, draw the charge out from 4 to 10 in. as may be determined by experiment, leaving an air space between the charge and the bottom of the hole. Place an 18-in. loose dummy next to the charge, and then insert and crown a second dummy and tamp the hole tight from the second dummy to the mouth of the hole.

When this charge is detonated the shock of the detonation is absorbed by the air surrounding the charge, and the expanding gases are transferred into a blasting agent. The effect of the action on the coal is apparently retarded and spread over a large area with a heaving out effect rather than a shattering and pulverizing effect. The air cushions at either end of the charge supply the spring and balance for the depth of the cut, and results are comparable to those obtained from the use of black powder.

Success with the floating shot requires a careful study of the coal seam being mined and partings to be eliminated, coupled with experiments to determine the proper placing of the cut; number and spacing of holes; grade and quantity of permissible explosive to be used; order of shooting holes, and careful adherence to detail. Attention should also be given thoroughness in cutting, cleaning of cuts and drilling necessary to the success of any method of shooting.

Cutting, Drilling and Order of Firing (Figure 5)

Cuts should be of uniform depth the entire width of the working face and with well formed corners, so that the explosive will pull to best advantage. This is accomplished by sumping in on line with one rib to the depth desired, cutting across the face at uniform depth, and sumping out on line with opposite rib. Thickness of kerf should be not less than 5 in. in order to facilitate cleaning and allow sufficient room for expansion when coal is shot. All cuttings should be completely removed from the kerf before firing shots. Loaders should square up working face before leaving so that succeeding cut may be properly made.

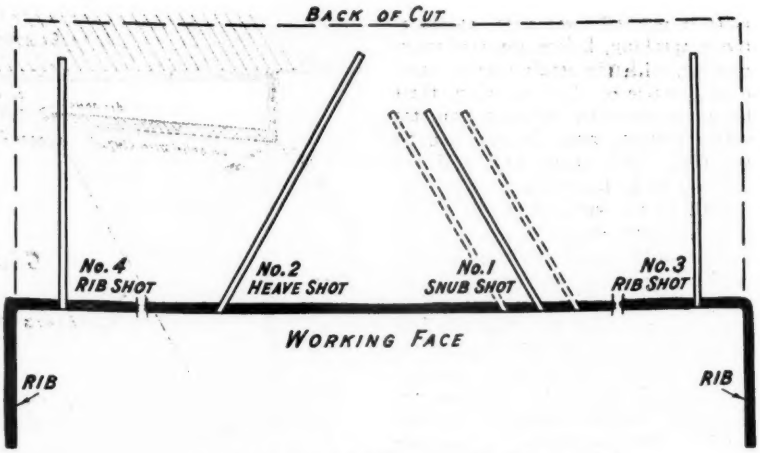


Fig. 5. Location of holes and order of firing

As stated above, drill holes should be about ¾ in. larger in diameter than the diameter of the explosive, to allow room for the cardboard or fiber rings used to support the explosive. For explosive 1¼ in. in diameter use a 2-in. diameter hole. However, in some mines smaller holes and correspondingly smaller rings have been used very satisfactorily. Drill holes should be to the full depth of the cut not to exceed 7 ft., or as determined by experiment. Rib holes should be parallel with ribs and not over 18 in. from same. Snub and breaker holes should be as determined by experiment so as to bring down the coal with a minimum of explosive and the greatest proportion of large sizes.

Where the cut is by shortwall machine or universal machine the snubber shot should be fired first, followed by the breaker shot, and after one or two cars of coal have been loaded out the rib shots may be fired, thus giving each rib shot opportunity to heave out the coal. The quantity of explosive to be used in each hole should be determined by experiment. Where the cut is by arc-wall machine, best results are usually obtained by firing the rib shots first and loading out several cars of coal before firing the center shots.

Advantages of the "floating shot" as compared with the tightly tamped charge of permissible explosive:

1. Is just as safe and usually safer due to more care in tamping.
2. Holes are loaded just as quickly.
3. Is a better balanced shot, with greater springing area and spreading power and a heaving out effect.
4. Requires less explosive.
5. Does not shatter or pulverize the coal.
6. Produces a greater proportion of larger sizes of firmer structure that can be handled with a minimum of degradation.
7. Partings and other foreign matter, when present, are not shattered or pulverized and can be more readily removed.
8. Causes less damage to bad roof.
9. Overshooting is not as damaging to coal or roof.

The floating shot, when used in accordance with the above procedure, has been permitted by the West Virginia Department of Mines. In mines where used with the above features in mind, results have been most satisfactory.

Quicksilver Resources of California

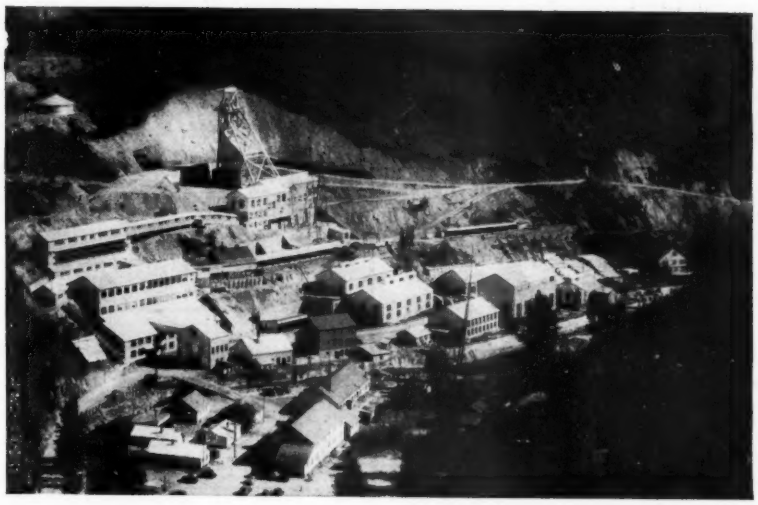
A timely, state-wide treatise (133 pages long, well illustrated with photographs, maps and tables) on the *Quicksilver Resources of California,* by Alfred L. Ransome and John L. Kellogg, is now being distributed from the offices of the Division of Mines, Department of Natural Resources. The report is well organized and systematically arranged. The descriptive matter on each property can thus be readily found. In addition to detailed data on the mines and prospects, there is a general discussion on history, economics, production, prices, uses, mineralogy and geology. The last 10 pages are devoted to a bibliography.

The authors state: " . . . from 1850 to 1939, there has been produced in this State approximately 2,400,000 flasks of quicksilver having a total value in excess of $117,000,000. . . . " . . . From the review of about 120 mines in 23 counties in California that have produced quicksilver, as well as many potentially productive prospects and claims in these as well as other counties, it is evident that quicksilver mineralization is widespread in the State. . . ."

This quicksilver report is presented by the Geologic Branch, and should be used in conjunction with its recently published *Economic Mineral Map of California, No. 1—Quicksilver.*

STREAMLINED VENTILATION at SUNSHINE

By JOHN EDGAR
and
ALVIN W. KNOERR
Sunshine Mining Company



Modern surface plant at Sunshine mine, with Jewell shaft at top

● ***Extensive Recent Improvements, Not Yet Completed, Have More Than Doubled Volume of Air Circulated Underground, and Reduced Temperatures in Lower Levels 8 Degrees***

THE Sunshine Mine is situated on Big Creek 2½ miles south of U. S. Highway No. 10, mid-way between Kellogg and Wallace, Shoshone County, Idaho, in the heart of the Coeur d'Alene mining district.

The Sunshine vein system occurs in a large shear zone some 300 ft. in width and of an indeterminate length. Silver-bearing tetrahedrite (freibergite) is the chief ore mineral which occurs in a gangue of siderite, quartz and pyrite. The veins vary in width, within ore shoots, from less than 1 ft. to 8 ft., with an average of 4½ ft. Because the veins frequently split and necessitate the mining of several feet of waste between the segments, and because small stringers of ore occasionally parallel the vein in either wall, the average stope width is 7 ft. The vein has been stoped for more than 2,000 ft. of strike length and to a depth of 2,700 ft. below the Sunshine adit level (Fig. 1), and is developed and ready for mining for 400 ft. below that. A shaft station has been cut on the 3,700 level where development work will soon be under way.

Mining Methods

Mine workings are accessible by three shafts: the vertical 4-compartment Jewell shaft which extends from the surface to a depth of 3,875 ft. or 175 ft. below the 3,700 level; the inclined 2-compartment No. 2 shaft which extends from a point in the adit level 1,500 ft. from its portal, to the 1,900 level; and the No. 3, 2-compartment vertical winze extending from the bottom of the No. 2 shaft on the 1,900 level to the 3,100 level.

Stoping is carried on by a timbered, cut-and-fill method. A heavy, slabby hanging-wall requires the use of much timber which, in 1939, totaled 15.6 board ft. per ton of ore extracted. During the first quarter of 1940 stoping, development and exploration extended from the 900 level to the bottom of the Jewell shaft, a vertical distance of approximately 3,000 ft., as well as some 3,000 ft. longitudinally.

The rock temperature gradient at the mine is approximately 1.2 degrees per 100 ft. of depth, ranging from an average yearly temperature of 49.2° F. at the surface to a rock temperature of 91.5° F. at the bottom of the Jewell shaft, 1,192 ft. below sea level.

Before the start of the present program, the mine was ventilated by a 36-in. by 24-in. Jeffrey centrifugal-type fan installed on the main level. This fan, with a capacity of some 30,000 cu. ft. of air per minute, drew air down the Jewell shaft, east along the drifts, up through the stopes and manways, and exhausted up an old raise to the No. 4 tunnel and out into the atmosphere. This system was fairly adequate down to the 2,700 level, but early in 1939 it had become evident that increased depth, with a corresponding increase in rock temperatures, and extensive lateral developments were rapidly making the old system inadequate.

Present Ventilation System

Under present operating conditions, air enters the mine through the Jewell shaft and the Sunshine Tunnel. Approximately 15 percent of the total intake passes down the Incline shaft from the Sunshine Tunnel to the 500 level where it joins the main upward

exhaust of the mine. The remaining 85 percent which is downcast through the four 4½-ft. by 5½-ft. compartments of the Jewell shaft, enters the working areas of the mine through the 2,300, 2,500, 2,700, and 3,100 crosscuts which accommodate approximately 5,000, 5,000, 21,000, and 16,000 c.f.m. respectively (see Fig. 1). These straight 6-ft. by 8-ft. crosscuts vary in length from 700 ft. to 1,450 ft. and offer little resistance to airflow.

Timbered 5-ft. by 7-ft. drifts distribute the air horizontally through the active lower levels which average 1,850 ft. in length. Inter-level ventilation takes place through 5-ft. by 5-ft. cribbed raises and cap-raises of similar dimensions, both types of which are flanked with pairs of joker chutes. Since most of the stopes are mined in step-like cuts which apex toward the ore raises, favorable currents rising through follow-up manways, occasional open sets, and ore chutes, ventilate the stopes before joining the upcast raise currents.

At present it is advantageous to permit most of the 2,300-level and 2,500-level volumes to rise through the overlying western operating portions of the mine. About 50 percent of the 2,700 volumes are likewise upcast through the west end of the ore body, while the remaining quantity continues eastward and ventilates overlying stopes and intermediate levels. All of the air entering the 3,100 crosscut is directed to the eastern workings of the mine.

Since ore raises are of restricted area and are difficult to maintain as efficient air channels, the upcast exhaust is augmented by a system of two-compartment timbered ventilation raises (Fig. 2) extending from the 2,700 level to the No. 4 Tunnel—approximately 3,200 ft. of raises of which 2,500 ft. have been completed. These raises have a free inside area of 60 sq. ft., and have been driven in the hanging-wall and foot-wall to eliminate the influence of mining operations in adjacent veins and fractured zones. Raises are oriented north-south across the east-west shearing to present the short end of the raise to the direction of ground pressure. As an additional guarantee of permanence, all raise sets now being installed are treated with Cuprinol to prevent timber decay. Steel safety ladders have been installed diagonally across corners of all raises to serve as safety exits and permit periodic inspection. Approximately 780 ft. of 8-ft. by 8-ft. crosscuts have been driven to

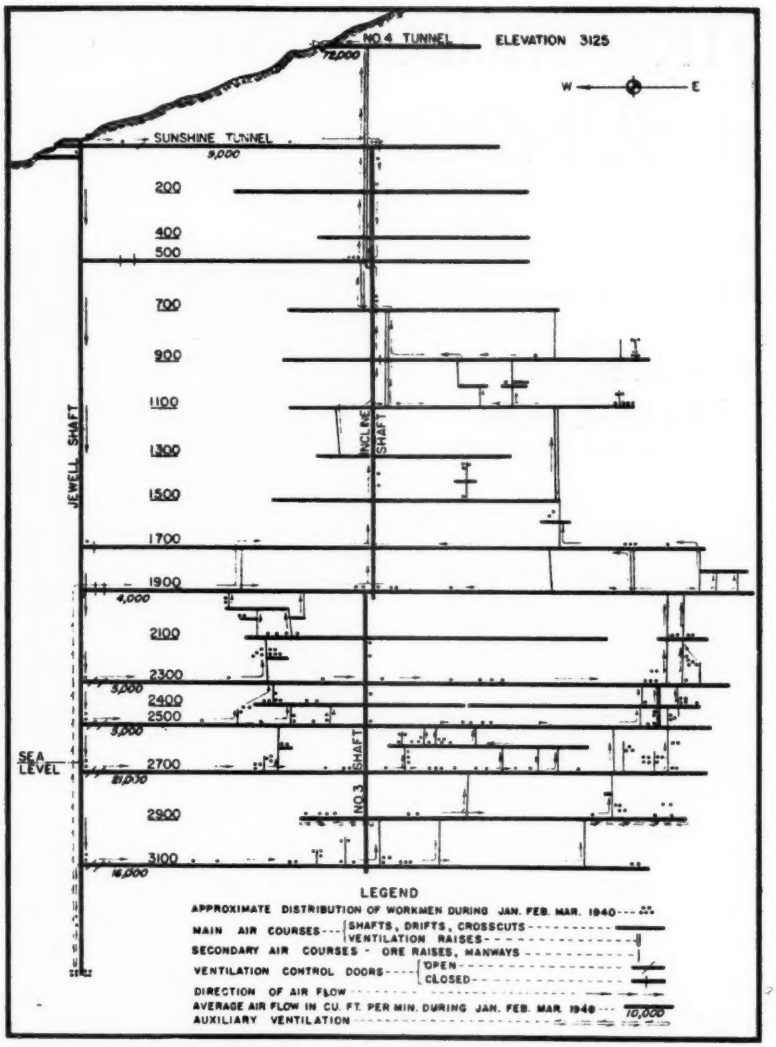
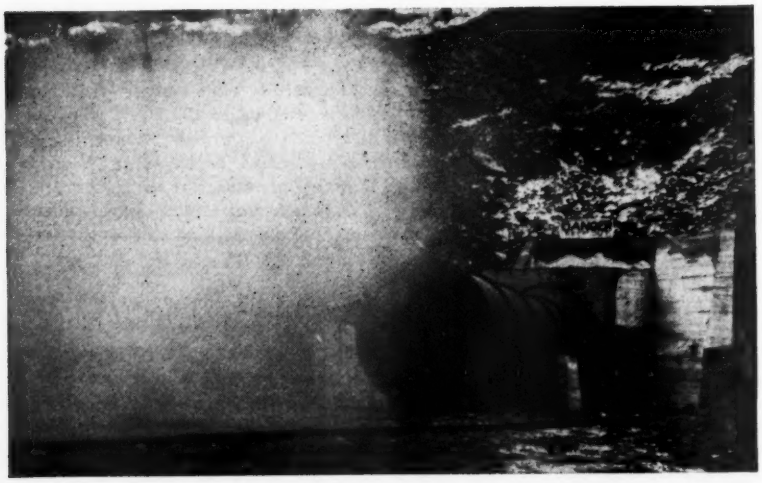


Fig. 1. Air distribution diagram



Jeffrey Aerodyne 8-60 installation at the No. 4 tunnel

connect the ventilation raises, and 450 ft. of drifts and crosscuts have been enlarged to similar dimensions to permit free flow of air.

In addition to the ventilation raise system, the Incline shaft offers a parallel exit for exhaust air from the 1,900 level to the 500 level where the vitiated air joins the downcast air from the Sunshine tunnel and then passes upward through the 500 ventilation raise. As soon as conditions permit, the air in the Incline shaft will be downcast to the 1,900 level, thus confining the entire exhaust to the ventilation raises. If, in the future, as the mine grows larger it is found that the 60 sq. ft. of free area inside the present raises are insufficient, one or two additional compartments can be readily added. The square-set timber simplifies the addition of extra sets, and experience with the 4-compartment Jewell shaft has indicated that at least four compartments, oriented north-south, can capably withstand ground pressures.

A Jeffrey Aerodyne 8-60 8-bladed fan has been installed in the concrete portal of the No. 4 Tunnel (Fig. 3). This unit of aluminum construction, which is equipped with a 50-hp. motor, exhausts an average of 72,000 c.f.m. If necessary this volume can be increased to 100,000 c.f.m. by changing the pitch of the variable aeroplane-type propeller and by increasing the size of the motor. An additional advantage of the unit is its ability to operate in reverse. Preliminary tests thus far have demonstrated that the fan can operate in reverse at about 60 percent of its forward efficiency.

Further flexibility in operation has been effected by equipping all shaft stations with rugged 4½-ft. by 6-ft. ventilation doors mounted on ¼-in. by 2-in. steel strap hinges. Concrete bulkheads 1 ft. in thickness encase the door frames and eliminate leakage satisfactorily. Where pressures are moderately high, two concrete frames have been placed some distance apart and a door hung on the high-pressure side of one frame and on the low-pressure side of the other. A batter to the door frame keeps the doors closed by gravity. This arrangement, which serves as an effective air-lock, permits the doors to be opened with ease, and is effective against any change in direction of pressures which a reversal of ventilation currents might produce. Since constantly changing conditions require frequent changes in the positions of ventilation doors, a metal sign is posted on each one advising miners whether that door is to be kept open or closed.

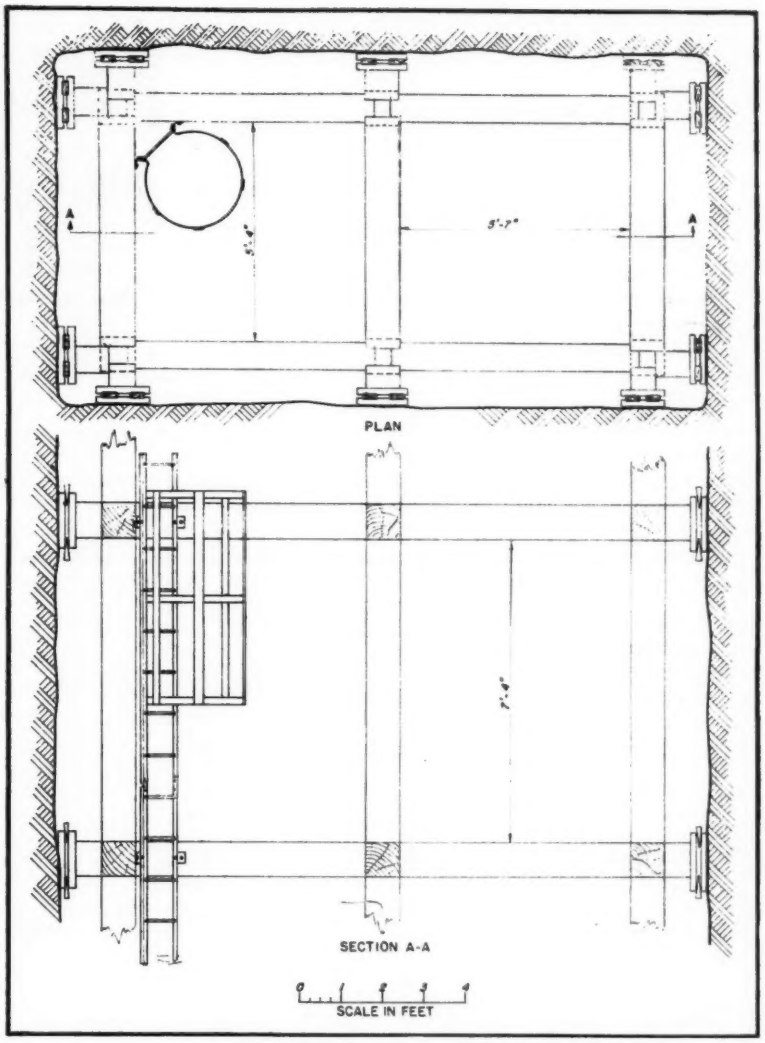


Fig. 2. Ventilation raise timber details

Drifts, crosscuts, and shaft which are somewhat removed from main air paths are ventilated by auxiliary systems consisting of TM-6 and TM-8 Ventair Blowers, and various sizes of Buffalo Blowers. Volumes varying between 1,500 and 4,000 c.f.m. are directed to working places through 12-in. and 14-in. galvanized fan pipes and effectively clear these areas of blasting smoke 40 minutes after blasts.

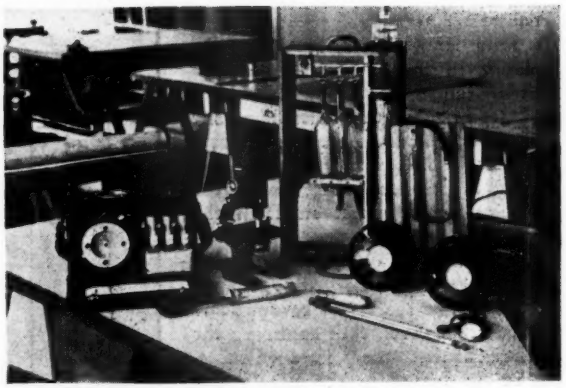
Defrosting the Jewell Shaft

During the months of January and February, occasional prolonged periods of freezing weather cause the formation of ice in the first 500 ft. of the Jewell shaft. When this ice builds up to a point where it hinders the passage of skips and cages, thawing operations must be carried on between shifts. From an abandoned adit tunnel that parallels the Sunshine Tunnel, a short crosscut was driven to intersect the shaft 35 ft. above the top station. This old adit also connects with the ventilation raises and is normally bratticed off with one of the previously described doors. In the thawing operation, this door is opened and the main exhaust fan is stopped. Under these conditions some 30,000 cu. ft. of air per minute will continue to circulate due to the natural draft afforded by the up-cast raises, and approximately half of this is by-passed through the old adit and re-enters the shaft. This 12,000 or 15,000 cu. ft. of 70° air per minute is enough to raise the tem-

perature of the downcast air well above freezing and rapidly melt the ice.

Improvements Effected by Present System

There are 650 ft. of raising and 200 ft. of crosscutting yet to be done before the immediate project is complete, and until this work is finished no comprehensive picture of the results of the system can be formed. Progress has been, of necessity, quite slow. The raises and crosscuts have developed a great deal of waste which has to be disposed of without disrupting mining operations. Consequently conditions have improved gradually and few men in the mine realize what has been accomplished in the 16 months since the project was started. Two very definite results have been obtained: (1) the volume of air circulated through the mine has been more than doubled, and (2) the temperatures of the lower levels have been reduced an average of 8° F.



Equipment regularly used to determine ventilation conditions accurately

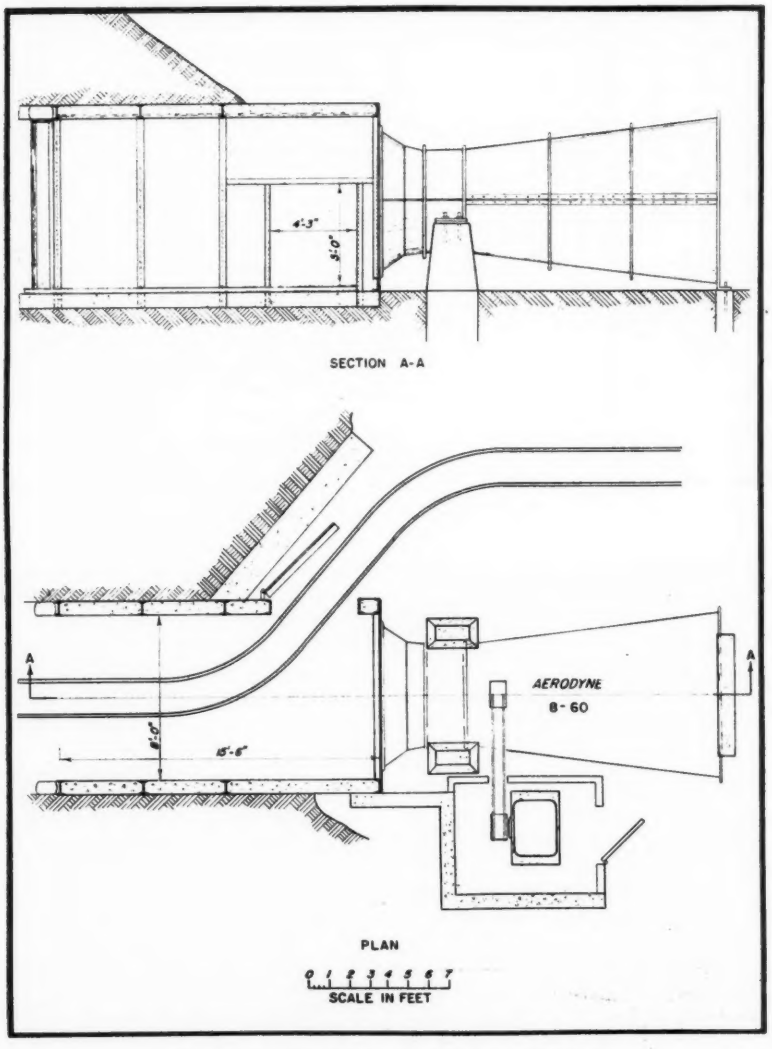


Fig. 3. Diagram showing details of fan installation

Responsibility for proper maintenance of the ventilation system is in the engineering department. Weekly studies are made of the volume, temperature and relative humidity of intake and exhaust air as well as of certain critical or representative points in the circuit. Associated with this, also, is the dust control program. Periodic dust counts are made in every working place to determine whether sufficient volumes of air are circulating to dilute dust concentrations below permissible limits. Air-and-water sprays are used in drifts, raises, and crosscuts to precipitate dust and absorb gas in these headings. To make these studies and maintain adequate records of them requires time and equipment. The following is a list of the equipment regularly used at the Sunshine in an effort to maintain a true picture of conditions: high and low-speed anemometers and "smoke gun" (stannic-chloride ejector) for testing air velocities; sling psychrometer for temperatures and humidities; Orsat equipment for air analyses; midget impinger, and counting microscope for dust particle counts.

Ventilation is a perpetual problem which presents an ever-changing set of conditions. To establish a system—drive the necessary raises and crosscuts, and start up the fan—does not permanently solve the problem. Conditions never remain static and are never so good that they cannot be bettered. The program under way at the Sunshine mine is flexible in this respect, and no radical changes will be required to increase the capacity of the system whenever increased depth and lateral extension of the mine require it.

DIXIELAND'S MINERAL INDUSTRY—Its Phenomenal Growth in the 20th Century

By OSCAR H. REINHOLT
Mining Engineer and Statistician

IT IS in the South, possessor of both coal and oil, that the statistical battle between these two mineral fuels—in the matter of production rather than in consumption—has been the most pronounced within the United States. The competition, however, is not at close range since the geographic center of oil production is found in eastern Texas and that of coal mining in eastern Tennessee. Of all the 12 states between the Potomac and the Rio Grande, only 4 have so far contributed any petroleum in quantity. Tennessee's share is trivial, much less than that of Mississippi, which may amount to 3 million barrels or more during 1940, its first year of production.

In 1902 coal constituted 51 percent of the total value of the South's total mineral production of only $57 million. Petroleum contributed hardly 8 percent and ranked fifth. Iron ore was second with 12.6 percent; stone third with 9.7 percent; and even phosphate rock, with 8.6 percent, outranked petroleum in 1902, the year after the great Lucas gusher spouted at Spindle Top near Beaumont.

About three decades ago, or shortly after the initial noteworthy discovery of oil in Oklahoma, petroleum passed coal in annual value. The margin was steadily extended, and in 1937, as graphically indicated in Fig. 2, this fluid fuel furnished 63.5 percent of $1,569 million, the total value for about 50 mineral products obtained throughout the South. Oil's share, amounting roundly to $1,000 million, made twelve times as much as coal, worth at the mines $83.5 million for 7 of the 12 southern states.

Our country is on the verge of reaching a new record in petroleum production during 1940. The previous peak of 1,279 million barrels attained in 1937 may be surpassed by 90 to 110 million barrels, which is about half the output of either Russia or Venezuela per annum. This great gain can be credited largely to the uncontrolled contribution from Illinois, which has refused to enact control laws and is thus in the same class with California. The South, however, striving to restrict overproduction, will likely fall short fully 30 million barrels of its peak of 842 million barrels (established also in 1937), notwithstanding the minor addition from Mississippi.

Rejuvenation for Coal Industry Before 1950

It appears beyond belief that geophysical prospecting, said to be about completed for the Gulf Coast belt, can add many more new fields or deeper sands to the present petroleum sources in the South. Slowing down of new developments and steady depletion of the known resources may cut down southern oil production to as little as 350 or 400 million barrels per annum by 1955, if not sooner. By 1960, coal should be well on its way in the South in supplying motor fuel through hydrogenation. As a result of processing the solid fuel for other purposes as well, the American coal industry should begin to feel the throbs of rejuvenation even before 1950, because the patents for the conversion of coal into oil have been acquired by the larger oil companies. Although its prosperity may never equal the highest of any past year, even if 800 million or more tons of bituminous coal will have to be mined annually to meet the extra demand for hydrogenation, the inevitable reduction in the enormous flow of oil from the South during the next decade should promote improvements in the coal industry far more than similar decreases to be realized in California and even in Illinois.

In view of the fact that the four

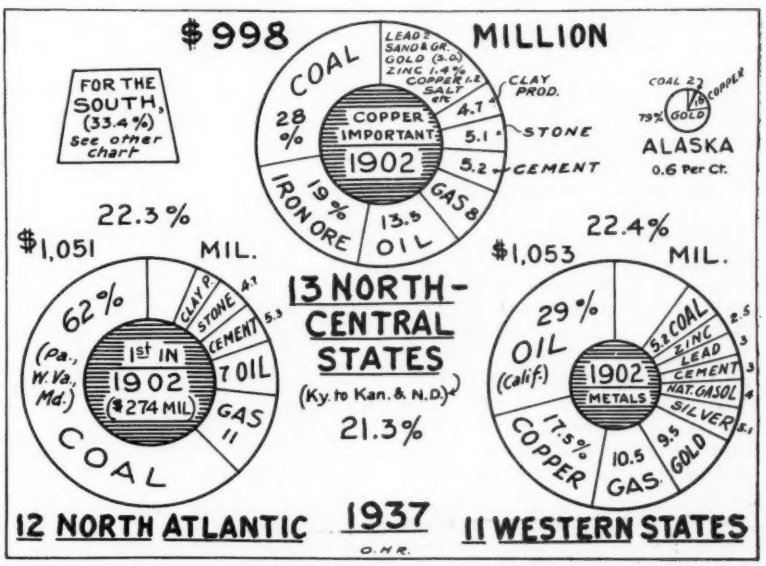


Fig. 1. Comparison of 1937 mineral production with that of 1902 for major regions in United States. Note that coal still outranks oil and gas in North Atlantic and North Central regions

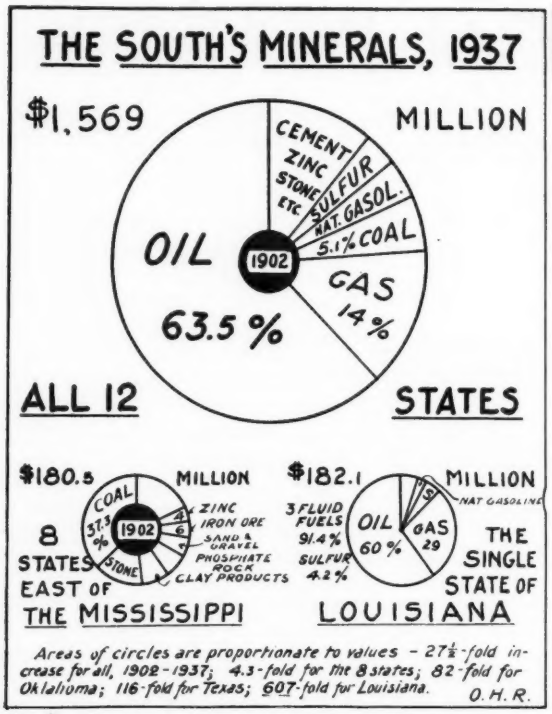


Fig. 2. Comparative importance of the South's mineral output in 1937, by products, and in 1902

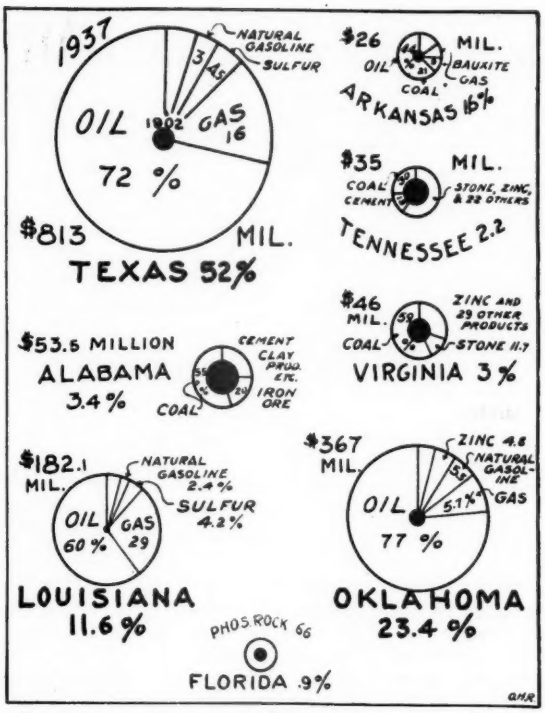


Fig. 3. Geographic sources of the South's mineral production in 1937

mineral fuels—oil, gas, coal, and natural gasoline—constitute nearly seven-eighths of the total value of southern minerals, the following summary of outstanding facts about the South should prove of interest.

In 1937 the South supplied 33.4 percent of the mineral products of the United States, or about half again as much as any of the other three major regions—the North Atlantic, North Central, and Western—as shown in Figs. 1 and 2.

Texas topped Pennsylvania in yearly output in 1935 and ever since. Alabama actually led Michigan in mine shipments of iron ore during 1932, standing next to Minnesota for the first time in history.

The world's deepest extraction of minerals is proceeding along the Gulf Coast. There Louisiana alone has a dozen oil fields at or below 10,000 ft. The deepest well—one of the Foh's Oil Company in Terrebonne Parish, La.—is yielding petroleum from a 12-ft. zone between 13,254 and 13,266 ft., which is about 6/7 of a mile deeper than the world's deepest (gold) mines situated in South Africa and in Brazil.

No other major American region compares with the South in rapidity of recent mineral development. The spread of geophysical prospecting since 1922 and the much earlier application of rotary drilling (which holds a record of 1,400 ft. for 24 hours) have done most to increase the total value of mineral products from $57 million in 1902 to $1,569 million in 1937. The South's share in the national total rose during the same period of 35 years from 15.3 percent to 33.4 percent.

Comparative Regional Increases in Value of Mineral Output

The rate of appreciation, 1902 to 1937, was 27½-fold for the 12 south-

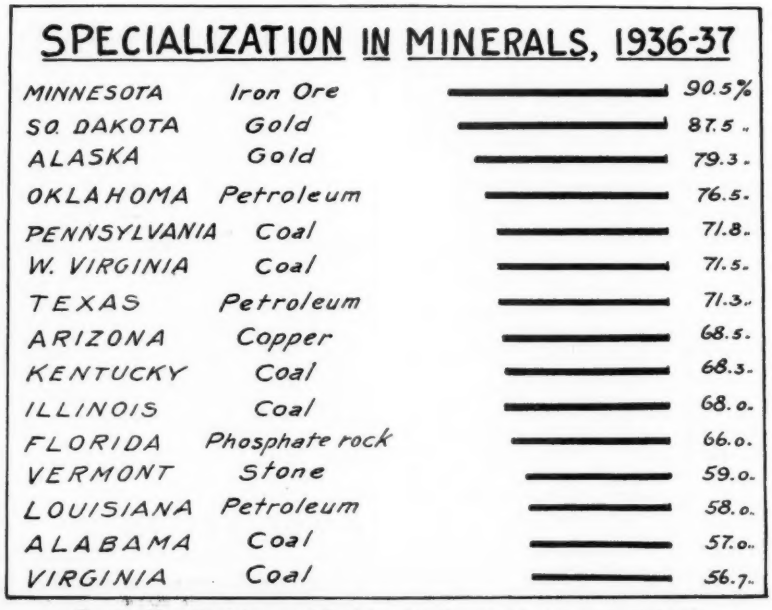


Fig. 4. How 15 states specialized in mineral output in two years, 1936-37

ern states, compared with a 6-fold increase for the 11 western states, a 3-fold rise for the 13 north central states (Kentucky to Kansas to North Dakota), and a nearly 3-fold gain for the 12 north Atlantic states, inclusive of West Virginia. Meanwhile the expansion for the whole country came to nearly 6-fold. Of all the states, Louisiana boasts the biggest individual increment—607-fold during this 35-year period. The "Lone Star State" stands second in rate of growth in mineral production—116-fold; but it leads all others in absolute advance—a little more than $800 million during the same time. Oklahoma's production expanded 82-fold.

As regards the yield of petroleum per square mile of state area, Oklahoma overshadowed the others during the past three decades. "Of cattle and cotton Great Texas is full; *of oil, Oklahoma, Wyo*ming of wool." In December, 1939, the "Sooner State" was discharging 6.2 barrels of liquid fuel per square mile; Louisiana, 6.1 barrels; and Texas, 6 barrels. However, early in 1940 Illinois dislodged Oklahoma from such supremacy.

In respect to known reserves of mineral oil, the states of Texas, Louisiana, Oklahoma, and Arkansas on January 1, 1940, contained together two-thirds of the national total calculated at almost 18.5 billion barrels by the American Petroleum Institute. The east Texas field, the world's greatest in area, reserves and current output, holds about one-fifth, and the entire state, fully one-half or 53 percent, while contributing three-eighths of the present production of petroleum.

Certainly immense though not completely measured in every case are the much longer lived resources in marble, kaolin, rock salt, phosphate rock, iron ore, bauxite, native sulfur and potash. The last named is still latent, but within two or three years the Texas part of the Permian basin will likely compete with the mines in southeastern New Mexico, which are now the nation's chief source of potash. Tabulated above is a comparison of the five more important mineral reserves, omitting rock salt of enormous extent and the difficultly gaged helium, natural gas, natural gasoline, and native sulfur.

Of the U. S. bituminous coal reserves, Alabama has 4.7 percent; Oklahoma, 3.9 percent; Texas, 1.8 percent; Virginia, 1.5 percent. Of the phosphate rock, Florida has about 50 percent and Tennessee 11 percent, these two supplying about 99 percent of current demand. Of the iron ore, Alabama possesses by far the greatest reserves, mainly as Clinton hematite or "red" ore, and is furnishing 99 percent of all demand for southern iron ore. Fully 95 percent of all North American bauxite is being supplied by Saline and Pulaski counties, near Little Rock, Ark. It is claimed that four-fifths of the world's reserves in native sulfur occurs in salt domes of the Texas-Louisiana Gulf Coast.

Comparison of the five important mineral reserves of the South

Mineral Deposits	Unit Used	No. of Units in Reserves, 1940	Percent of U. S. Reserves	Yearly Depletion	Life in Years
Bituminous coal	Million short tons	175,000	12.5	58 *	3,000
Phosphate rock	Million long tons	31,500	62	4	8,000
Iron ore	Million long tons	2,000	?	6.7	300
Bauxite	Million long tons	67	99?	0.5	134
Petroleum	Billion barrels	12.3	67	0.8	15

* About 38 million tons extracted each year; about 20 million tons left underground unrecoverable; no allowance for extra extraction for use in hydrogenating coal into oil.

Story of Alloy Steels Presented By Sound Picture

The wonder-story of alloy steels, those special products contrived through the years in the research laboratories of the world to make possible the tough, sturdy steels demanded by modern industry, is told in a sound motion picture film recently produced by the Bureau of Mines in cooperation with an industrial concern. The film, entitled "Alloy Steels—A Story of Their Development," is in 16- and 35-millimeter widths and requires 20 minutes for showing.

The opening scenes show a toolsmith at work in an old-time shop, using early methods of fashioning tools by hand. Next is depicted the "cementation" process—the making of blister bar steel by adding carbon to wrought iron—a process known by the ancients and re-discovered many years later by European workers.

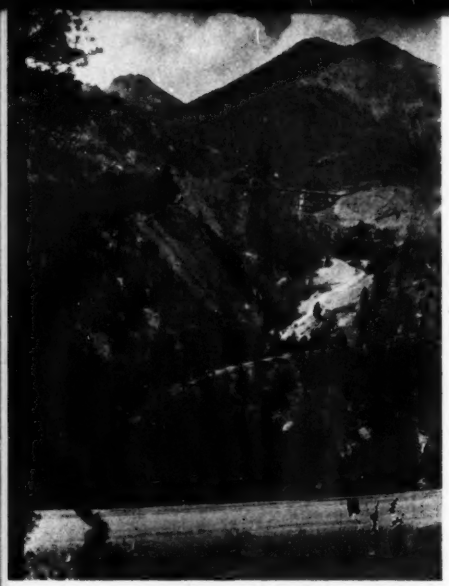
The scenes which follow continue the portrayal of "milestones" in the history of the development of alloy steels. In 1742 Benjamin Huntsman produced the most reliable and uniform steel known in his day. In 1868, Robert Mushet added manganese and tungsten to high-carbon steel, and found that the resulting alloy would harden when cooled normally in air. He thus originated the first self-hardening tool steel. In 1890, an improved method of heat treatment made possible the development of cutting tools that ran at the unheard-of speed of 100 to 150 feet per minute. Within a few years, many brands of high-speed steels were on the market, and progress had been made in the field of production of alloy steel. During this same period Julius Baur's chromium steel process was patented, Sir Robert Hadfield perfected a high manganese steel bearing his name, and French metallurgists first alloyed steel with nickel. Molybdenum, then vanadium, entered the industry.

Between 1900 and 1906 several brands of English and American high-speed steel of the same chemical composition as the modern 18-4-1 steel made their appearance. The advent of the automobile created a need for stronger, more reliable steel, and in 1912 the SAE numbering system for carbon and alloy steels was established.

In 1917 the molybdenum deposit at Bartlett Mountain, Climax, Colo., became the source of supply for British and American steel makers. In 1918 metallurgists developed the chromium-molybdenum series. In 1919, chrome-silicon steels were introduced, followed in 1921 by chrome-nickel-molybdenum steel; in 1922, by nickel-molybdenum steel; and in 1926, by manganese-molybdenum steel. In 1930 molybdenum again took its place in the manufacture of high-speed cutting tools. Small percentages of tungsten were combined with molybdenum and the resulting steels were standardized. In 1934, research in combining tungsten with molybdenum and other alloyed elements in high-speed steels continued. In 1938, laboratory and field studies brought about improvements in both tools and in production of alloy steel. The reel ends with views in modern steel plants and shows equipment used for the heat treatment and fabrication of steel.

This film, "Alloy Steels—A Story of Their Development," may be obtained for exhibition purposes by schools, churches, clubs, civic and business organizations, and others interested by applying to the Bureau of Mines, 4800 Forbes Street, Pittsburgh, Pa. It should be stated whether 16- or 35-millimeter width is desired. No charge is made for the use of the film, but the exhibitor is expected to pay transportation charges.

Formation of the Young Coal Company, a stripping project near White Plains, Ky., was recently announced by Charles H. Young, of Madisonville, president of the concern. The general manager is Charles H. Young, Jr. It is expected production will start August 1.



Getting Set for Colorado Springs

● ***Heavy Advance Interest in the Field and an Exposition Sell-Out Presage Outstanding Success for 7th Annual Metal Mining Convention and Exposition of the American Mining Congress.***

HAVE you made your plans yet to join with thousands of your fellow mining men in Colorado Springs the week of September 16 at the Seventh Annal Metal Mining Convention and Exposition? If not, it's high time to evaluate the host of valuable attractions on tap, and set your course for the vicinity of Pikes Peak about a month hence. From every advance indication, this meeting of the Western Division of the American Mining Congress is going to be the most important ever held, and you can't afford to miss it!

Here, specifically, are the drawing cards—first, a program that covers the most vital problems facing your industry at one of the most crucial times in its history, discussed by noted authorities; second, a display of machinery and supplies that is going to be the most complete ever assembled for metal mining men by the nation's leading manufacturers; third, a series of first class entertainment features affording enjoyable recreation each evening; fourth, an opportunity to inspect world-renowned Colorado mining enterprises, and fifth, the unparalleled chance of rubbing elbows and making friends with your fellow mining men in a district noted for its cordial western hospitality and steeped in fascinating mining history.

Many who are making the trip to Colorado Springs will doubtless wish to avail themselves of the further opportunity to broaden their knowledge of western mining by attending the 1940 Regional Meeting of the A.I.M.E., to be held the preceding week in Salt Lake City. A single trip from headquarters will permit attendance at both meetings, and the intervening time can be well spent in visits to some of the famous mining enterprises or scenic spots of the Rocky Mountain region.

Top Notch Program

Under the enthusiastic leadership of Chairman J. C. Kinnear, the Program Committee has now virtually completed a slate of A-1 discussions of problems on which the industry is now focusing its attention. Top rank speakers in mining and related fields will contribute their best efforts in getting to the core of each subject.

Take a careful look at the advance program shown on the oppcsite page,

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Arrangements Committee Chairmen

MERRILL E. SHOUP
Local and State Finance

MRS. A. E. CARLTON
Ladies

MRS. A. C. MAGRUDER
Ladies Entertainment

W. I. HOWBERT
Reception

RUSSELL D. LAW
Entertainment

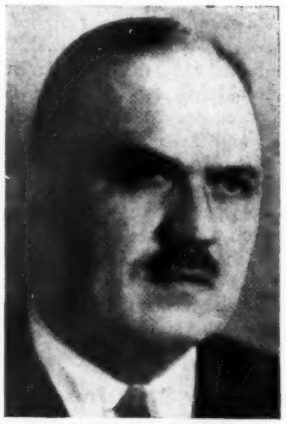
GEORGE KEENER
Hotel

GEO. H. RUPP
Trips

ERNEST NOWELS
Publicity

J. A. KNIGHT
Transportation

RUSSELL D. LAW
General



MERRILL E. SHOUP
Chairman, Western Division, American Mining Congress

and note how it is fitted to the times. Under the critical world conditions of today, there'll be unusual interest in the Monday afternoon session on "Minerals in the Present Emergency," discussed by such eminently qualified speakers as C. K. Leith, E. W. Pehrson, J. R. Van Fleet, Robert Linton and H. C. Parmelee. And then there'll be a symposium Thursday afternoon on "The War's Effect on Metal Mining," with leaders in zinc, copper, lead, iron ore, gold, silver, mercury and tungsten, reviewing the results of hostilities on supplies, international movements, domestic markets, and prices of these metals. Speakers include Howard I. Young, D. M. Kelly, E. R. Dondorf, Jean McCallum, H. L. Pierce, J. H. Riddle, Worthen Bradley and Chas. H. Segerstrom.

New developments in metal mine operation will be reviewed in two separate sessions Tuesday afternoon—one on geology and mining, including

(*Continued on page* 32)

Advance Program

MONDAY, SEPTEMBER 16

Morning Session

HEALTH AND SAFETY

Sick Absenteeism

Andrew Fletcher, Vice Pres. and Treas., St. Joseph Lead Co.

Discussion—Ultra-Violet Ray Solarium
Stanly A. Easton, Pres., Bunker Hill & Sullivan Mng. & Conc. Co.

Progress in Mine Safety

G. J. Barrett and D. F. Donovan, Oliver Iron Mining Co.

Discussion

H. A. Walker, Asst. Gen. Mgr., Homestake Mng. Co.

Propaganda and Practical Experience In Dust Control

Evan Just, Sec., Tri-State Zinc & Lead Ore Producers Assn.

Discussion

LUNCHEON AND WELCOME TO DELEGATES

Presiding: Merrill E. Shoup, Chairman, Western Division, A.M.C.

Welcoming Addresses

Hon. George D. Birdsall, Mayor of Colorado Springs

Hon. Ralph L. Carr, Governor of Colorado

Hon. Edwin C. Johnson, U. S. Senator from Colorado

Responses:

Howard I. Young, Pres., American Mining Congress

J. C. Kinnear, Chairman, Program Committee

A. S. Knoizen, Chairman, Manufacturers Division, A.M.C.

●

Afternoon Session

MINERALS IN THE PRESENT EMERGENCY

Role of Minerals in the Present War

C. K. Leith, Mineral Advisor, National Defense Advisory Commission

Strategic Mineral Procurement

Elmer W. Pehrson, Mining Engineer, U. S. Bureau of Mines

Stimulation of Domestic Production of War Minerals

J. R. Van Fleet, V. P., U.S. Vanadium Corp.

General Discussion

Robert Linton, Cons. Engineer, Los Angeles, Calif.

H. C. Parmelee, Editor, Engineering & Mining Journal

●

TUESDAY, SEPTEMBER 17

Morning Session

GENERAL

Industrial Uses of Silver

Alexander Goetz, California Institute of Technology

Public Mineral Land Withdrawals

Richard L. Neuberger, Portland, Oregon

Discussion

Robert S. Palmer, Sec., Colo. Mng. Assn.

Victor J. Hayek, Sec., Mining Assn. of the Southwest

H. L. Faulkner, Counsel, Alaska Miners Association

Public Relations of the Metal Mining Industry

"The Homestake Saga"—A motion picture showing the importance of mining in one of the agricultural states

Discussion

Carl J. Trauerman, Pres., Mining Assn. of Montana

Charles F. Willis, Sec., Arizona Small Mine Operators Assn.

LUNCHEON, Myron Stratton Home

Presiding: David P. Strickler, Pres., Stratton Cripple Creek Mng. & Dev. Co.

Speaker: Dr. R. R. Sayers, Dir., U. S. Bureau of Mines

●

Afternoon Session

NEW DEVELOPMENTS IN METAL MINE OPERATION

(Two separate sessions)

"A"—GEOLOGY AND MINING

Mining Geology Today

Ira B. Joraleman, Pres., Desert Silver, Inc.

Discussion

Edward Thornton, Gen. Mgr., Summitville Cons. Mines, Inc.

Geo. M. Fowler, Cons. Geol., Joplin, Mo.

Francis A. Thomson, Pres., Montana School of Mines

New Developments and Equipment in Metal Mining

Robert S. Lewis, Professor of Mining, University of Utah

Discussion

F. S. McNicholas, Asst. G. S., Climax Molybdenum Co.

Robert W. Thomas, G. M., Ray Mines Div., Nevada Cons. Copper Corp.

J. Wilbur Van Evera, Crosby, Minn.

J. J. Curzon, Mgr., Chelan Div., Howe Sound Co.

"B"—MILLING, PLACER MINING AND GOLD RECOVERY

Progress in Milling Practice and Equipment

Bancroft Gore, Prof. of Metallurgy, South Dakota School of Mines

Discussion

Elmer Isern, Chf. Met., Eagle-Picher Mng. & Smelt. Co.

Patrick Butler, Butler Bros.

Max W. Bowen, Mill Mgr., Golden Cycle Corp.

T. G. Chapman, Dean, Univ. of Arizona

New Developments in Placer Mining and Recovery of Gold

Charles M. Romanowitz and Herbert A. Sawin, Yuba Cons. Gold Fields

Discussion

WEDNESDAY, SEPTEMBER 18

Morning Session

TAXATION

National Defense and National Finance

Ellsworth C. Alvord, Counsel, A.M.C.

Pending Tax Legislation

(To be announced)

Specific Tax Problems of Metal Mining

Arthur L. Baldwin, Denver, Colo.

Donald A. Callahan, Wallace, Idaho

A. G. Mackenzie, Sec., Utah Chapter, A.M.C.

Robert M. Searls, San Francisco, Calif.

General Discussion

●

Afternoon Session

WAGE HOUR—MINING LOANS—CARLTON TUNNEL

Administering the Wage-Hour Act

Philip B. Fleming, Administrator, Wage and Hour Division, U. S. Dept. of Labor

Discussion

H. L. Faulkner, Counsel, Alaska Miners Association

Edgar T. Zook, Counsel, Idaho Maryland Mines Co.

Expansion of R. F. C. Loans for Mining

Hon. James Murray, U. S. Senator from Montana

Discussion

The Carlton Tunnel

A. H. Bebee, V. P., Golden Cycle Corp.

Discussion

●

THURSDAY, SEPTEMBER 19

Morning Session

LABOR PROBLEMS—MONETARY POLICIES

The National Labor Relations Board—An Example of Administrative Agencies

Edmund M. Toland, General Counsel, Special Committee to Investigate the N.L.R.B.

Discussion

Present-Day Industrial Relations

C. S. Ching, Dir. of Industrial & Public Relations, U. S. Rubber Company

Discussion

D. D. Moffat, V. P., Utah Copper Co.

H. M. Lavender, G. M., Phelps Dodge Corp.

Fiscal and Monetary Policies of the United States

(To be announced)

Discussion

●

Afternoon Session

THE WAR'S EFFECT ON METAL MINING

Review of War's Effect on Supplies, International Movements, Domestic Markets, Prices, Etc.

Copper—D. M. Kelly, Vice Pres., Anaconda Copper Mng. Co.

Lead—E. R. Dondorf and Jean McCallum, National Lead Co.

Zinc—Howard I. Young, Pres., American Zinc, Lead & Smelting Co.

Iron Ore—H. L. Pierce, Vice Pres., Hanna Iron Ore Co.

Gold—J. H. Riddle, Economist, New York City

Silver—(To be announced)

Mercury—Worthen Bradley, Pres., Bradley Mining Co.

Tungsten — Chas. H. Segerstrom, Pres. Nevada-Massachusetts Co.

ANNUAL BANQUET

Toastmaster: R. M. Hardy, Pres., Sunshine Mining Co.

Address: Hon. Key Pittman, U. S. Senator from Nevada

papers by Ira B. Joralemon and Robert S. Lewis; and the other on milling, placer mining and gold recovery, the speakers including Bancroft Gore, Charles M. Romanowitz and Herbert A. Sawin.

Ranking authorities discussing different aspects of labor problems comprise Edmund M. Toland, C.S. Ching, and Colonel Philip B. Fleming, speaking on the N.L.R.B., industrial relations and the Wage-Hour Act.

Problems of taxation, monetary policies and mining loans will be analyzed Wednesday by Ellsworth C. Alvord, Senator James Murray and other highly qualified men.

Safety and health—subjects of cardinal importance in mine operation—will be discussed at the opening session Monday morning by Andrew Fletcher, Stanly A. Easton, G. J. Barrett, D. F. Donovan and Evan Just.

Other prominent men scheduled to talk on subjects of equal import include Alexander Goetz, Richard L. Neuberger, Robert S. Palmer, Victor J. Hayek, Carl J. Trauerman, Charles F. Willis and A. H. Bebee. Included among the luncheon speakers are the Honorable Edwin C. Johnson, U. S. Senator for Colorado; Governor Ralph L. Carr, of Colorado, and Dr. R. R. Sayers, director of the U. S. Bureau of Mines.

Local Arrangements

Arrangements to assure smooth functioning of all local activities for the enjoyment of visitors are being pushed by committee chairmen under the general direction of Merrill E. Shoup, chairman of the Western Division of the American Mining Congress. Included is the planning of details on finance, by Merrill E. Shoup; reception, by W. I. Howbert; entertainment and general activities, by Russell D. Law; hotel accommodations, by George Keener; trips, by George H. Rupp; publicity, by Earnest Nowels; transportation, by J. A. Knight; and ladies entertainment, by Mrs. A. E. Carlton and Mrs. A. C. Magruder.

Entertainment

Western hospitality will be on parade when the time comes each evening for the full enjoyment of recreation hours. Here are the highlights of the "fun program":

Monday—Informal western get-together dinner-dance at the beautiful Broadmoor Golf Club.

Tuesday—Steak fry on the lofty heights of Cheyenne Mountain, surrounded by a rare scenic panorama.

Wednesday—Ice carnival at the Ice Palace, with a dazzling array of talent cutting speedy and rhythmic figures on the crystal surface.

Thursday—Annual banquet, with Senator Key Pittman, friend of western mining, as the speaker, and unrivaled entertainment.

Special attractions are being arranged for the ladies during the daytime. They are assured a royal welcome, so don't fail to bring them along.

Trips

Friday and Saturday of convention week will be devoted to inspection trips to well-known mining enterprises in Colorado—all being within easy striking distance from Colorado Springs and offering a variety of fascinating accomplishments in mining. Special points of interest include historic Cripple Creek, the world-renowned Carlton deep drainage tunnel, Climax Molybdenum Company's operations, the Golden Cycle Mill, the Minnequa plant of Colorado Fuel & Iron Corp., at Pueblo, Leadville, and other nearby districts.

Exposition a Sell-Out

With virtually every foot of space now contracted for, the exposition promises to be the most comprehensive, instructive and colorful display of metal mining equipment and supplies ever staged. Be sure to "cash in" for up-to-the-minute knowledge on brand new developments and latest applications of the time-tested "standbys" at each and every booth. Here are the manufacturers, to date, who will be there to help you:

ALLEN-SHERMAN-HOFF CO.
AMERICAN BRATTICE CLOTH CORP.
AMERICAN STEEL & WIRE CO.
ANACONDA WIRE & CABLE CO.
ATLAS POWDER CO.
BUCYRUS-ERIE CO.
C. S. CARD IRON WORKS CO.
CARNEGIE-ILLINOIS STEEL CORP.
CLEVELAND ROCK DRILL CO.
COFFING HOIST CO.
COLORADO FUEL & IRON CO.
CRANE COMPANY
CRUCIBLE STEEL CO. OF AMERICA
DENVER EQUIPMENT CO.
DENVER FIRE CLAY CO.
DIFFERENTIAL STEEL CAR CO.
DORR COMPANY
E. I. DU PONT DE NEMOURS & CO., INC.
THOMAS A. EDISON, INC.
EIMCO CORPORATION
ELECTRIC STORAGE BATTERY CO.
ENGINEERING & MINING JOURNAL
GARDNER-DENVER CO.
GENERAL ELECTRIC CO.
GOODMAN MFG. CO.
HENDRIE & BOLTHOFF MFG. & SUPPLY CO.
HERCULES POWDER CO.
INGERSOLL-RAND CO.
INTERNATIONAL NICKEL CO.
JEFFREY MFG. CO.
JOYCE-CRIDLAND CO.
KANSAS CITY STRUCTURAL STEEL CO.
A. LESCHEN & SONS ROPE CO.
LINK-BELT CO.
MANCHA STORAGE BATTERY LOCOMOTIVE CO.
MARION STEAM SHOVEL CO.
MINE SAFETY APPLIANCES CO.
MINE & SMELTER SUPPLY CO.
MINING CONGRESS JOURNAL.
MORSE BROS. MACHINERY CO.
OHIO BRASS CO.
OWENS-CORNING FIBERGLAS CORP.
JOHN A. ROEBLING'S SONS CO.
SAUERMAN BROS.
SHEFFIELD STEEL CORP.
SKF INDUSTRIES, INC.
SOCONY-VACUUM OIL CO., INC.
SULLIVAN MACHINERY CO.
TAMPING BAG CO.
TEMPLETON, KENLY & CO.
TIMKEN ROLLER BEARING CO.
TRAYLOR ENGINEERING & MFG. CO.
TYLER CO., W. S.
UNION WIRE ROPE CORP.
U. S. BUREAU OF MINES
U. S. STEEL CORP. SUBSIDIARIES
VICTAULIC CO. OF AMERICA
WESTERN CARTRIDGE CO.
WESTINGHOUSE ELECTRIC & MFG. CO.

Attractions galore await you at Colorado Springs, September 16-19—so come early and stay late.

Be on hand to "cash in" on the valuable discussions shown above, arranged for your benefit by the Program Committee under Chairman J. C. Kinnear (left). Below is shown a full house at the 1939 convention.

Renewed Field Coils Prolong Armature Rewind Life

By A. C. ROE
Engineering Division
Westinghouse Elec. & Mfg. Co.

THE internal condition of the main and commutating field coils in any series type motor influences the useful life that can be obtained from a rewound armature.

Most maintenance programs recognize that field coils with defective external ground insulation are a hazard and must be eliminated. But few maintenance programs take into account the destructive effect of defective internal field coil insulation on motor operation; i.e., short armature life, rapid brush wear, excessive sparking, rapid deterioration of ground insulation on good field coils, pitting of commutator face, etc. Many of these are traceable to internally defective field coils.

It has been proven by trial that good preventive maintenance requires the removal of all field coils (main and commutating) from the frame of any motor that has been shopped for armature burn-out, grounded, or shorted field coils, even if only one field coil is known to be defective.

Rewinds Decreased from 204 to 94

The practice of using only good field coils for rewound armatures has paid dividends in both mining and railway operations. In one case on a large mining property, the armature rewinds per year decreased from 204 to 94, although the tonnage of mined material was almost doubled. A large railway property in the East has been using the system for years with good results.

All field coils removed should be carefully checked for weak internal insulation and shorts between turns. All doubtful coils should be scrapped or rewound with new turn insulation.

Five Basic Rules

When the practice of removing all field coils has been established the following five rules should be made effective:

1. When re-fielding, never mix old or repaired field coils with new coils in any one frame.
2. Use either all new field coils, or all rebuilt field coils in the one frame.
3. Don't put one or more new field coils in with old coils for quick temporary repairs of this type. Use rebuilt coils.
4. Be certain that the polarity of all coils is correct, as wrong polarity will soon burn out a good armature.
5. For rewound armatures use only a frame that has all good field coils.

Here is Why

This practice is based on the fundamental principle of the series motor, where the current flowing in the armature and field circuit is of the same value. The field coils consist of a relatively few turns of a large-size conductor where one field coil turn has a high ampere-turn value. The motor torque is proportional to the product of the field strength and armature current. Also, for any change in field flux or ampere turns, the armature tends to adjust its speed to develop the proper balancing counter electro-motive force to maintain the proper current value.

Therefore, when field coils have internal defects, such as short-circuited turns, the resistance of the field circuit is lowered, and the field coil or coils with shorted turns has a lower resistance than a normal coil, with consequent lower ampere turns. Thus the tendency is to weaken the field, and the motor will tend to draw more current for the same load if the armature cannot speed up.

Good Coils Overloaded

The net results are that the remaining good field coils will heat up, while the shorted coils will be at a lower temperature than the good coils, or the defective coil or coils are the coolest coils. Thus one or more short-circuited field coils impose an overload on the remaining good coils in the motor.

Under these conditions the armature may be overloaded, causing it to burn out. When this occurs the fields are overloaded still further and may be weakened to the point of failure when the motor is again placed in service.

Directory of Montana Mining Properties

Memoir 20 of the State Bureau of Mines and Geology, the "Directory of Montana Mining Properties," is now ready for distribution, according to an announcement by Dr. Francis A. Thomson, director of the bureau. The memoir will be distributed from the president's office of the Montana School of Mines and a charge of $1 per copy will be made.

The new memoir consists of 112 pages of text covering the history, financial set-up, officers, properties, operations and equipment of close to 500 metal and coal mining ventures. The text is supplemented with 29 maps and four indexes. One of the indexes gives the names of all the individuals mentioned in the directory.

The directory was compiled by the Work Projects Administration, the authors being Carl J. Trauerman and Cecil R. Waldron, respectively supervisor and assistant supervisor of the project. Cooperating in the compilation of the new memoir were the Montana Bureau of Mines and Geology, the Montana School of Mines and the Mining Association of Montana.

In the foreword of the book Dr. Thomson states in part, "The present directory is in no sense a revision of the former publication in 1935. It represents an entirely new enterprise based upon careful collection of data."

GRINDING BALLS take to the AIRWAYS

● ***Copper Molybdenum Forged Alloy Steel Balls Help Solve High-Cost Air Transportation Problem of La Luz Mines, Ltd.***

By F. A. McCOY
Chief Metallurgist
Sheffield Steel Corporation

ABOUT a year ago, Sheffield Steel Corporation of Kansas City, Mo., received a large order for copper molybdenum alloy steel grinding balls from La Luz Mines, Ltd., operating a gold mine with no road connections in eastern Nicaragua, Central America. The balls, a part of which represented the initial charge for their new mill, were to be shipped from Kansas City to New Orleans, thence by boat to Puerta Cabezas on the east coast and finally by airplane to their destination 90 miles from Puerta Cabezas, Nicaragua.

The location of the La Luz Mines makes it necessary to use airplanes for transporting all equipment and supplies into the mine from the coast, and bullion out from the mill. Faced with this expensive transportation problem, La Luz found it necessary to select the most efficient materials available. In the case of grinding balls, they conducted extensive tests, the results of which proved that for their purpose, copper molybdenum forged alloy steel balls were superior to other types tested. The increased efficiency of these balls made them highly desirable, considering the high-cost of air transportation from the coast to their mines.

The La Luz ore has a hardness of 7.25 on Moh's scratch hardness scale (diamond is 10.00 on this scale). The ball charge is 45,000 lbs. and the peripheral speed of the mill is about 600 feet per minute.

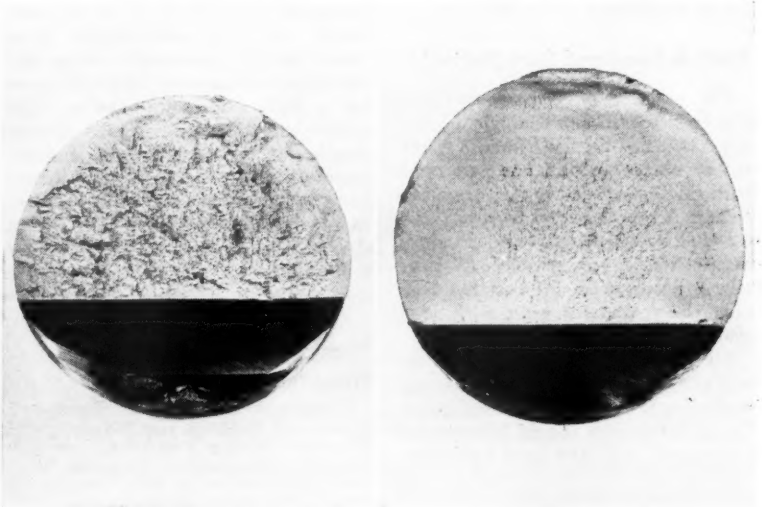
The physical properties of the balls chosen by La Luz for this exceptional work comprised a tough, dense grain structure; exceptionally high Brinell surface hardness penetrating deep into the interior of the ball, and corrosive resistance (copper content). While the desired surface hardness might possibly be obtained from a ball employing only high carbon content (without molybdenum), the resultant ball might have a tendency to break prematurely, or flake and spall—materially reducing its life.

By properly balancing a high carbon and molybdenum content and heat treating the alloy it has been possible, due to the presence of the molybdenum, to use a higher carbon content in the ball without danger of flaking or spalling, thus producing a finer grained, harder ball capable of grinding considerably more ore per ton than the average forged steel ball.

Physical Properties Discussed

Figures 1 and 2 show the fracture and give the surface Brinell, center hardness and average volume hardness of 3 and 4-in. diameter forged molybdenumized balls as compared with plain carbon forged balls in the same analysis range. Except for the molybdenum content and a maximum increase in carbon content of 8 points for the 3-in. molybdenum balls and 19 additional points of carbon for the 4-in. high molybdenum balls, the chemical analysis of the specimens is approximately the same (with the ex-

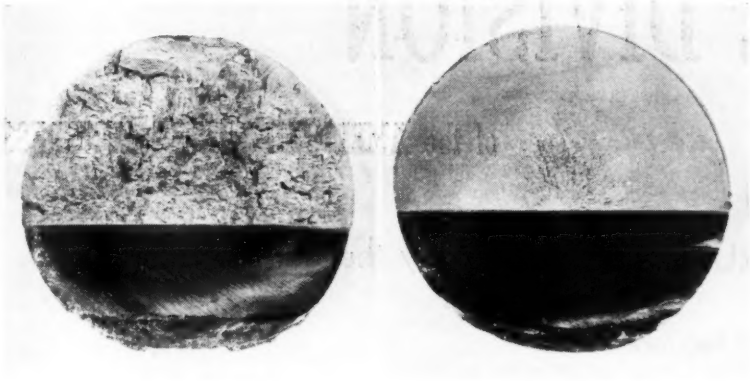
Fig. 1. Fractured sections of 3 in. diameter heat treated forged steel balls



	Regular carbon ball	Copper molybdenum ball
Dept of case	1/4"	5/8"
Surface brinell	640	720
Center brinell	360	455
Ave. volume brinell	470	660
Volume "fully hard"	42%	80%

Fractures were obtained by slowly grinding the balls with a rubber wheel and abrasives, part way through, then splitting with a chisel under a steam hammer

Fig. 2. Fractured sections of 4 in. diameter heat treated forged steel balls



	Regular carbon ball	Copper molybdenum ball
Depth of case	7/32"	1½"
Surface brinell	620	670
Center brinell	295	440
Ave. volume brinell	390	660
Volume "fully hard"	29%	98%

Fractures obtained in same manner described under Fig. 1

ception, of course, of the copper content of the molybdenum ball). Thus the improvement in toughness, as well as the increase in depth hardening not atttributable to the increase in carbon content (which carbon increase is only permissible because of the molybdenum content), is credited to the molybdenum.

In the illustrations it will be observed that in appearance the fracture of the balls containing molybdenum is strikingly different from the unalloyed balls. For instance, the depth of hardness penetration of the 3-in. molybdenum balls is more than double that of the plain carbon balls. The 4-in. molybdenum balls show a hardness penetration that is nearly seven times as great as that of the plain carbon 4-in. ball. It will also be observed that where the 3-in. carbon balls develop a surface hardness of 640, the molybdenum balls show an outer hardness of 720. At the center, the difference in Brinell hardness is even greater; 455 for the molybdenum balls and 360 for the plain carbon ball. In the 4-in. ball an average volume hardness of 390 b.h.n. for the plain carbon ball compared with 660 for the high molybdenum ball.

To say it another way, a 3-in. section, the volume of the molybdenum ball is 80 percent "fully hard" as compared with 42 percent for the plain carbon ball. In the larger 4-in. balls, the volume of the molybdenum ball is 98 percent "fully hard" as compared with 29 percent for the unalloyed ball. This gives a final result of practically the same average volume hardness in both the 3-in. and 4-in. diameter molybdenum balls.

The consistent production of grinding balls with these characteristics requires complete control in the mill and the laboratory. All steel is made in Sheffield's own open hearth furnaces. The grain size of each heat is carefully watched, and the heat is not approved for forging until it is definitely known to be of the proper analysis and McQuaid-Ehn grain size. Experience has shown that non-metallic inclusions may have a marked effect on grain size; their presence, therefore, is carefully watched. In addition, sections cut from the bars to be used for forging blanks are macro-etch tested to determine pipe or other possible defects.

Special Sizing Equipment

Balls are produced from a round bar of copper molybdenum alloy steel by upsetting. Sizing is accomplished in a machine especially designed by Sheffield engineers for the purpose. Except for the fact that the operation runs through several additional cycles in the case of smaller balls, the sizing process is about the same for both large and small balls.

Special precautions are taken to insure proper heat treatment for each heat of balls. Before treatment on a large scale is attempted, a pilot group of balls is sent ahead to the quench. These balls are then broken open and, from inspection of the fracture, the proper regulation heat treatment temperatures are determined.

Perhaps the best evidence that the adoption of a high carbon molybdenum alloy ball has been successful is the fact that these balls have been reordered by La Luz; in addition, a number of other foreign and American mines have standardized on this alloy as a composition which will give unusually low cost per ton of ore ground.

Boulder Conveyor in Tri-State

A new device to facilitate the disposal of large waste rocks from the screening room above the hopper at Eagle-Picher Mining Company's American mill at Oronogo, Mo., was recently placed in operation.

Featuring the unit is a chain conveyor extending on a tramway built from the corner of the screen room to a small dump hopper, having a capacity of about five tons. The drive sprocket at the dump end of the conveyor is cast with lugs to engage the chain links, and is driven by a 5.5-hp. electric motor with gear reduction box operating at a speed of about 100 ft. a minute. Operation is by means of a push-button type control switch near the foot of the conveyor in the screen room.

Boulders are rolled by hand from the grizzly onto the chain conveyor. From the dump hopper, the boulders are loaded into trucks and hauled to the edge on top of the huge waste pile for disposal.

The unit was designed by Jack Gilbert, of Joplin, superintendent in charge of Missouri operations of the Eagle-Picher Company, who pointed out that it was installed primarily to lower grinding costs in the mill, and will undoubtedly increase the recovery of ore handled. Prior to the installation of this conveyor, the boulders were beat through the screen grizzly by hand.

Blackhawk To Increase Capacity

The Blackhawk Consolidated Mines Co. at Mogollon, N. Mex., is making preparations for an increase in its mill capacity to 250 tons of ore daily, by installation of new equipment, including larger settling facilities. In carrying forward this expanded program, the company has announced that Dewel Kennedy, for some years in the employ of the company, has been appointed mill superintendent. Ira L. Wright is general manager of the operation, which in the past has been producing at the rate of 200 tons per day.

With the COAL DIVISION

of the AMERICAN MINING CONGRESS

TENTATIVE SAFETY RULES — Submitted by the Safety Committee

• *Special Rules for Haulage Men*

1. Motormen should be required to see that their locomotive and its appliances are at all times in safe operating condition. Should the equipment not be in safe condition, the motorman or brakeman should be required to make the necessary repairs to make it safe, or should the repairs be of such nature that he cannot do the necessary work to put the equipment in safe operating condition, he should be required to report it to the mine foreman, or an assistant mine foreman, and discontinue using the equipment until satisfactory repairs have been completed and the locomotive and appliances are safe for operating. No repairs or adjustments should be permitted to be made while in motion or while the trolley pole is on the wire. In gassy mines disabled locomotives should be towed to repair shop.

2. Locomotives should be required to be operated at a reasonable speed and kept under full control at all times. Whenever trolley pole flies off the wire, brakes should be required to be immediately applied and controller closed before attempt is made to replace the trolley pole on the wire. Locomotives should be permitted to be operated only while motorman is seated in cab or deck.

3. Haulage men should be required to take careful note of the condition of the haulageways and report to the mine foreman or assistant foreman any dangerous places, unsafe track, or defective wiring or bonding.

4. Whenever a motorman leaves his locomotive he should be required to place the controller in neutral, remove the trolley pole from the wire, and the brakes should be tightly set. In the event of a derailment or other accident to locomotive in operation, and it is necessary for the motorman to leave his equipment to flag or seek assistance, the trolley pole should be permitted to be left on the wire to provide power for the headlight to warn other employes.

5. No motorman should be permitted to entrust his equipment to another employe without specific instructions from the mine foreman, assistant mine foreman or motor boss.

6. Motormen should be positively prohibited from alighting while the locomotive is in motion to throw switches, to open doors, or for any other reason except to protect themselves or others from injury in case of obstruction or derailment.

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The special rules shown here are a part of a complete set covering all operations of mining that are being prepared by the Safety Committee. Some of these have already been published, and others will appear in subsequent issues of the Journal.

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7. Brakemen, when boarding or alighting from a moving trip, should be required to do so from the side or rear end of trip only and should not run in track ahead of moving trip. Every brakeman should be forbidden to ride between cars, or on the head end of a loaded trip when backing.

8. Every motorman and brakeman should be forbidden to make coupling while standing on or between bumpers of cars or locomotive. No attempt should be permitted to be made to couple or uncouple cars while in motion or from the trolley wire side, or from the inside of a turn except when absolutely unavoidable.

9. Every motorman and brakeman should be forbidden to sand the track by directing sand on rail with hand or hands while the trip is in motion.

10. Every motorman, brakeman or other employe should be forbidden to throw or hold switch latches over with his hands or feet while the trip is approaching or passing over switch points.

11. The motorman or brakeman on every trip should be required to keep an accurate count of the mine cars in the trip in order that he may know if any cars have been lost in transit so that he may protect himself and other employes from injury.

12. The trolley pole should be required to trail and never be pushed ahead in regular running.

13. Whenever a locomotive is not in front of a trip it is hauling or moving, a light should be required to be carried on the front end of such trip. All main line trips should be required to carry a trip light on rear end of trip.

14. Motormen should not be permitted to move trips until given the proper signal by brakeman.

15. All locomotives should be equipped with an alarm which should be sounded by the motorman at all places where men or livestock may be encountered, and when approaching doors, curtains, side tracks and curves on haulways.

16. Cars should not be permitted to be uncoupled or stored on grades unless securely blocked or under control. (See Rule 5 of Special Rules for Miners and Loaders.)

17. Haulage trips should be required to be separated at least 300 feet while in motion; also locomotives running alone, and man trips.

18. Trap doors should not be permitted to be open except while trips are passing through. In case of an accident or an emergency stop, the trip should be cut and the door closed promptly.

19. When the mine is not in regular operation, as on the night shift or on idle days, a motorman should be required to stop and listen when advancing around turns or through trap doors to avoid collision.

20. Haulage men should be required to conceal the cable of their cap lamps under their clothing or wear it under their arm to prevent catching it on cars or other objects.

21. Motormen should be required to shut off the controller and set the brakes when there is an interruption of power.

22. No man trips should be permitted to be attached to loaded trips. No trip where the grade is in favor of the load should be permitted to have empty cars between the motor and load.

23. In mines where dispatchers are used, they should have complete authority over the transportation system, and no motorman should be permitted to run past any telephone without first being instructed by them.

24. Under no circumstances should a motorman be permitted to reverse or "goose" his motor for braking purposes, except in emergencies.

• *Special Rules for Mining Machine Runners and Helpers*

1. It should be the first duty of every employe engaged in mining machine operation to see that his machine is in good repair and well lubricated, and that all appliances in connection therewith are in safe operating condition; and should any part of his equipment not be in such condition, he should be required to immediately report it to the mine foreman, assistant mine foreman or machine boss, and discontinue its use until satisfactory repairs have been completed.

2. Machine runners and their helpers should be required to inspect the sides, roof and face of each working place before beginning to work, and if any evidence of weakness is found, additional timbers should be required to be set and replaced as the machine is moved across the face in order to protect themselves and equipment from injury.

3. In mines that are potentially gaseous, the machine men should be required to test for gas with appropriate equipment provided therefor before commencing a cut, and during and after completion of a cut where required by the local mine management.

4. No place should be permitted to be cut unless all employes are away from the face except those authorized.

5. No person should be permitted to ride on mining machines when being moved by locomotive.

6. In order to prevent injury to the machine runner by reason of insecure position of the machine jack, the helper should be instructed to hold the jack in position, and the machine runner should be required to see that the helper observes this caution until the runner has moved to a position where the jack in falling will not injure him.

7. Every machine runner and helper should be required to see that the bits of the machine are at all times set to gauge, that dull bits be changed as required, and that the bit clutch is out and power disconnected when practicable when changing bits.

8. If at any time a machine or machine cable is being repaired by the runner, the helper should be instructed to take the electrical connections from the power circuit and keep the connection in his possession until such repairs have been completed and the machine runner instructs him to replace the connection.

9. Every employe should be instructed to guard against the swinging of the mining machine when the jacks are tightening at the time the machine starts cutting.

10. No employe should be permitted to cross over cutter bar of the mining machine at any time, but should pass around the rear of the machine.

11. Machine runners should be required to stay at the rear of the machine at all times as nearly as practicable while it is cutting coal, and remain in the rear of the machine until it has sumped up. When necessary to go to the front of the machine, the machine should be stopped and bit clutch disengaged.

12. From time to time during the progress of their work, the machine runner and helper should be required to examine the working place to see that it is not becoming unsafe; and if in the progress of their work it is necessary for them to remove timbers which have been set to secure the roof, they should be required to set additional timbers necessary to protect themselves from injury. Should unsafe conditions arise which they cannot correct, they should be required to suspend work and, if safe to do so, remove the machine to a safe place, and notify the mine foreman or his assistant.

13. Machine runner and helper should be held responsible for all tools required for their machines; they should also be held responsible for the condition of the tools, particularly the points of jack bars, which should always be kept pointed.

14. Machinemen should be required to protect themselves by setting safety posts where required while cutting across the face.

15. Machines should not be permitted to be sumped in high gear.

16. Lubricating or greasing should not be permitted while the equipment is in motion.

Safe conditions promote safe practices

The March of COAL MINING

Ten Years of Progress

POWER LINES FOR MECHANICAL LOADING

By G. B. SOUTHWARD
Mechanization Engineer
American Mining Congress

THIS article is to be a non-technical discussion of a highly technical subject—namely, power distribution lines for mechanized mining.

When a mine changes from hand to machine methods, there is of course an immediate increase in the amount of electrical power needed. Since the carrying capacity of a transmission line is limited by its size, it therefore follows that an increased demand for power necessarily implies an increased capacity in the transmission system which in a coal mine is the trolley wire, the machine cable, and the return through the rails. As is well known, there is a very definite power loss in overcoming the resistance of the conductors in the circuits, and unless these conductors have a sufficient carrying capacity, this loss due to the line resistance will use up so much of the generated power that the remainder which reaches the machines at the working places will not be sufficient for their effective operation.

A curious fact, and one that causes considerable power trouble, is that an electric motor will actually run under inadequate voltage and, from visual observation, may appear to be running efficiently. In other words, it is a very willing servant and will try to do its work to the point where it may burn itself up. But even though the motor itself is willing to work under such conditions, the management should not be willing to allow it, because insufficient power adds a very appreciable cost to the operation. This increased cost comes from three sources: First, a proportion of the current is wasted in generating heat instead of doing effective work; second, the decreased speed of the motor reduces the production rate of the machine and causes the machine to operate for a longer time in producing the same performance; and third, there is an increased maintenance due to overloading.

When mechanical loaders were first installed in coal mining, it was entirely natural that the question of power was overlooked by many operators, as the use of loading equipment required the development of so many other new practices in the different phases of mining. Since power in hand loading had never been a particularly serious item, it was some time before operators realized that under the new scheme of things power was now a major item in their mines, and that the existing facilities for generation and transmission were not adequate.

The reason why the transmission system for hand loading is not adequate for mechanical loading is very easily demonstrated. For example, consider the panel illustrated in Fig. 1, which shows a more or less typical room entry used for hand mining, the same being frequently adapted to mobile mechanical loading. This is indicated to have a length of 2,000 ft. from the main entry to the last room. The haulage way is laid with bonded track and has trolley wire along its entire length, but there is no track bonding or trolley wire in the rooms. The transmission system in this panel would therefore consist of 2,000 ft. of trolley wire, 2,000 ft. of bonded track and, in addition, a 300-ft. machine cable and its return to reach from the entry to the machine.

The line losses occurring in the transmission system can be calculated from the following two simple formulae:

The voltage drop in a copper wire is

$$\frac{\text{Amperes} \times \text{length of wire} \times 10.8}{\text{Circular mills of wire}}$$

and the voltage drop in bonded track is

$$\frac{\text{Amperes} \times \text{length of track}}{\text{Wgt. (per yd.) of rail} \times 1887}$$

In Fig. 1, assume that the panel is being worked by hand loading; therefore, the only machines used would be the gathering locomotive and the cutter. The general practice is to do the cutting at night so that the power load at one time would be either the gathering locomotive on the day shift or the cutting machine on the night shift. The gathering locomotive or the cutting machine would probably not use more than 50 hp. and a usual installation for this type of operation was to have 2/0 trolley wire and 30-lb. rail, bonded on both sides. A 50-hp. load is equivalent to 37.5 kw. which would require 150 amperes at 250 volts. Applying these figures to the above formula shows the following line losses in this circuit.

Trolley wire loss equals

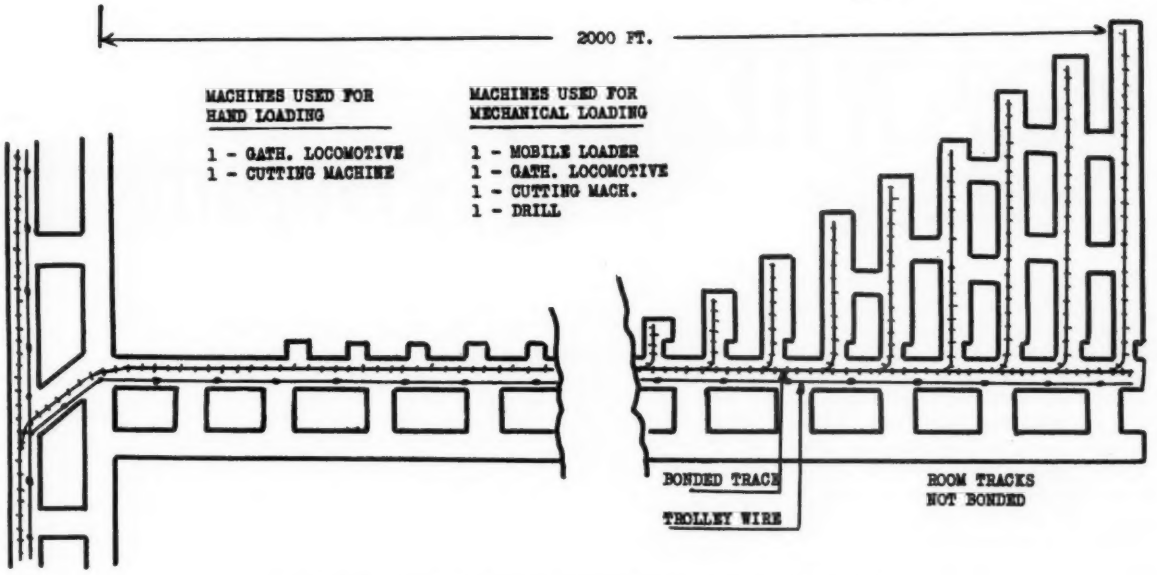
$$\frac{150 \text{ amps.} \times 2000 \text{ ft.} \times 10.8}{131.000 \text{ C.M.}} = 24.8 \text{ volts}$$

The loss in the return line through the track would be

$$\frac{150 \text{ amps.} \times 2000 \text{ ft.}}{30 \times 1887} = 5.3 \text{ volts}$$

The power loss in the 300-ft. machine cable and its return would be

$$\frac{150 \text{ amps.} \times 600 \text{ ft.} \times 10.8}{66370 \text{ C.M.}} = 14.7 \text{ volts}$$



Sketch showing working places and power lines for room and pillar panel

Adding these three losses gives a total voltage drop of 44.8. The maximum allowable drop is usually taken as 20 percent of the line voltage and since 20 percent of 250 volts would amount to 50 volts, the loss in the above example would be within the allowable limit.

If this panel is operated with mobile mechanical loaders, then there would be a loading machine, a gathering locomotive, a cutting machine and a drill all operating on the same shift. It seldom happens that all of these machines are operating simultaneously at full capacity, except occasionally and for comparatively short periods of time, and it has been found that the average continuous maximum load would be considerably less than the combined or total connected load. The total combined load in this panel would of course depend on the size of the machines used, and with different types of equipment might range anywhere from 100 to 200 hp.; but let us assume, for purpose of illustration, that the circuit must be adequate to carry a continuous load of 100 hp. which at 250 volts would mean 300 amperes. Then if we apply these figures to the equations we find the following:

The drop in the 2/0 trolley wire would be

$$\frac{300 \times 2000 \times 10.8}{131.000} = 49.6 \text{ volts}$$

The drop in the 30-lb. rail return would be

$$\frac{300 \times 2000}{30 \times 1887} = 10.7 \text{ volts}$$

The drop in the machine cable would be

$$\frac{150 \times 600 \times 10.8}{66370} = 14.7 \text{ volts}$$

The sum of these three losses would amount to 75 volts which is over the allowable maximum.

In order, therefore, to keep the line drop for a load of 100 hp. within approximately the same limit as for a 50-hp. load, the trolley wire would have to be size 4/0 and the track should be 40-lb. rail. Using these figures in the equation would give the following:

Drop in trolley wire	30.5 volts
Drop in rail return	8.0 volts
Drop in cable.....	14.7 volts
Total line loss...	53.2 volts or 21%

In presenting the foregoing, it is not, in any sense, the intention to submit a design for a wiring system. The figures that have been used are solely for the purpose of showing the difference in the power requirements between hand and mechanical loading, and to point out why a mechanized operation must have an increased carrying capacity in the conductors.

The design and calculations for an actual power transmission system have to take into consideration a great many more factors than have been discussed here. The line drop in the main trolley and feeders enter very materially into the problem, and the location of the substations with respect to the working places requires careful investigation. The proportion of the total connected load which would represent the usual sustained demand is affected by a number of items, such as the size of the operation, the severity of the mining conditions and the production rate. The combination of all these factors therefore makes the design of the power system in a modern mine a matter for trained technical knowledge and experience.

Coal Research Program Outlined

To gain new and regain old markets for the coal industry is the aim of the broad program of cooperative research of Bituminous Coal Research, Inc., funds for which are being pledged by coal operators throughout the country. Actual research work is scheduled to begin shortly, since campaign subscriptions already total $121,500. Howard N. Eavenson, well-known coal operator and engineer of Pittsburgh, Pa., is president of the research corporation.

Embodied in the 8-point research program are the problems of smokeless hand-firing of coal, completely automatic residential heating, dustproofing of coal, railroad locomotive fuels, publication of engineering bulletins, a standard smokiness index, modification of ash fusion characteristics, and emission of solids from stokers. The development of coal-consuming devices to improve the use of coal and to serve new markets will be the principal activity of the program. Manufacturers are being asked to cooperate in designing and manufacturing the new burners.

According to E. R. Kaiser, assistant to the president, Bituminous Coal Research, the research agency will also coordinate the research on coal throughout the country and keep executives and engineers of the coal industry constantly informed on trends in coal utilization and research by publication of periodical digests and engineering bulletins.

WHEELS of Government

As Viewed by A. W. Dickinson of the American Mining Congress

RESUMING on July 22 after the Democratic National Convention in Chicago, the Senate and House by mutual understanding recessed twice during the week and reconvened on July 29. Both Houses are really marking time until the Working Committee reports the additional defense legislation, including the military conscription bill, the $5,000,000,000 additional defense appropriation, and the excess profits tax and amortization bills. The additional $5,000,000,000 national defense measure, as requested by the President, is planned to be used in financing the naval expansion program, equipping the proposed army of 1,200,000 men, providing munitions to be held in reserve for 800,000 more soldiers, producing full equipment for the army and navy aircraft programs, and providing 15,000 army and 4,000 navy planes.

Many Washington observers attribute a peculiar significance to the departure of Vice President Garner for his home in Uvalde, Tex., immediately following the unhappy Democratic National Convention in Chicago. Some feel that this portends rough going for the Administration ticket in the coming election as the result of a growing disaffection in many of the southern states. The Vice President's action is also taken by some as a sign that the present Congress may not carry on much longer, as everyone realizes that all of the House members and a third of the Senators are anxious to be in their home districts from now until the November election.

Taxation

The National Defense Commission had not been functioning for many days before it became apparent that many of the manufacturers who were called upon to produce materials and equipment for the national defense were deeply concerned over the attendant tax problems. These manufacturers and producers remembered their experiences in the last World War, when they were caught with greatly expanded facilities representing capital expenditures which the Bureau of Internal Revenue was reluctant to allow as quick deduction against earnings in determining tax liability. As experienced and practical business men, the Defense Commission requested the Administration to provide authority for the amortization of such capital expenditures over a period of five years. Simultaneously, with Administration approval of such a plan, the President on July 1 sent a message to the Congress requesting quick enactment of a steeply graduated excess profits tax, and the Treasury Department and the Joint Committee on Internal Revenue Taxation immediately set to work upon the problem.

Members of the House Ways and Means Committee and the Senate Finance Committee, as well as Congressional leaders, are understood to be in favor of the immediate enactment of an amortization bill, but it is believed that they view with concern the present desire of the Administration to rush through a hastily constructed excess profits tax bill. It is apparent that the vast majority of business leaders believe that the excess profits tax measure need not be added to the revenue laws until next January, but the Administration is reported to feel that if the amortization bill is enacted separately, the Congress will quickly adjourn, thus leaving the majority party open to the charge that they have made gigantic appropriations without providing revenues to meet them, and that they are conscripting manpower without conscripting wealth.

The Ways and Means and Finance committees are now considering in executive session the plans for an excess profits tax which had been worked out by the Treasury at the request of the President. One proposal is that profits of corporations with invested capital under $500,000 be exempt to the extent of 6 percent on invested capital, although actual earnings for the years 1936-39 may have averaged less than that figure. Where the average earnings have been between 6 and 10 percent, the tax would be applied on profits above such average, but 10 percent would be the limit of exemption. On invested capital in excess of $500,000, a 4 percent exemption would be used if average earnings for 1936-39 did not exceed 4 percent; on earnings between 4 and 10 percent, the excess profits tax would begin at the average indicated, but all profit about 10 percent would be subject to the tax. The exemption for new corporations would be placed at a flat 8 percent of invested capital. In the computation of invested capital, borrowings up to $100,000 would be included, but in the range up to $1,000,000, the plan would only permit the inclusion of two-thirds of the amount borrowed, and in excess of $1,000,000 the amount to be included in invested capital would be one-third of the borrowed money. No announcement of proposed rates of excess profits tax has been made up to August 1, the date this is written.

Strategic Minerals

The Procurement Division of the Treasury, cooperating with the National Defense Commission and the Army-Navy Munitions Board, has carried on with its purchase of strategic materials, announcing totals on July 1 to include: 449 short tons of tungsten at $500,944; 14,800 lbs. of quartz crystals at $100,000; 11,400 lbs. of optical glass at $80,000; 14,800 bails of manila fiber at $246,221; 64,500 long tons of chromium ore at $2,106,250; 6,124 short tons of pig tin at $6,084,828; 86,500 long tons of manganese ore at $2,757,868, and 700,000 ounces of quinine sulphate at $415,000.

The National Defense Commission is continuing with the quiet and efficient building up of its organization, and the staff now includes many of the most able men to be found in the country. Coming directly from the

management of industrial enterprises, the members of the Commission and its staff are doing real work in the face of the aggravating restrictions and red tape that is always to be found in working with governmental departments and agencies.

By proclamation on July 2 the President exercised his authority to control by license exports of munitions, materials and machinery designated as essential to the national defense. Colonel Russell L. Maxwell was appointed Administrator of Export Control, and among the materials listed are aluminum, antimony, chromium, graphite, industrial diamonds, manganese, magnesium, mercury, mica, molybdenum, tin, tungsten and vanadium. Later, on July 26, a proclamation was issued which included No. 1 cast iron and steel scrap and certain petroleum products, especially high octane aviation gasoline.

RFC Loans

By authority of law (Public 664), prior to June of this year, the Reconstruction Finance Corporation now has the authority to make loans to corporations to produce strategic and critical minerals. This authority is considered by the RFC staff to apply to the Class A loans on mining properties which are able to show proven ore and which may be considered as growing enterprises. The RFC is empowered to create corporations for the purpose of acquiring and carrying strategic and critical materials. Such a corporation—the Metals Reserve Company—has been set up, and is capitalized at $5,000,000. Loans of $100,000,000 have been authorized to the company by RFC for the procurement of tin and manganese.

The bill, S. 4008, which passed the Senate on June 22 and which would authorize loans up to $40,000 for the purpose of developing gold, silver and tin and strategic and critical minerals of value to the United States in time of war, is still in the House Committee on Banking and Currency. Western congressmen who are interested in this bill anticipate that it will be reported at an early date and quickly approved by the House. S. 4008 has the approval of the RFC, and it is anticipated that it will be administered in a manner helpful to the development of all mining enterprises.

Federal Mine Inspection

The House Mines and Mining Subcommittee is engaged in a careful study of the record of the hearing and other material furnished bearing on S. 2420, the Neely Federal Mine Inspection bill. In the meantime, proponents of this measure have been pressing strongly for its enactment by representing to members of Congress that Federal inspection of coal mines would eliminate mine accidents. The preponderance of the testimony presented before the Mines and Mining Subcommittee clearly shows that mine accidents are reduced, not by the passage of laws and the exercise of police powers, but by thorough-going work in education in safety measures and the instilling of a safety consciousness in everyone connected with the operation of mines. The record made before the committee proved conclusively that reductions in accident rates of more than 80 percent made by some companies were the result of education and proper leadership.

It has been announced that the Guffey Act prices will be put into effect on September 3 by the Bituminous Coal Division, Department of Interior. Organization of enforcement methods and procedure to see that provisions of the law are carried out, is now under way. In the face of a national defense program, the practical application of this law is a matter of conjecture, as it is greatly feared that if its administration cannot be sufficiently flexible, serious situations may arise in the coming winter months.

Foreign Trade Agreements

Secretary of State Hull acted early in July on the changed picture in international trade due to the World War, by replacing the Division of Trade Agreements in the State Department by what is now termed the Division of Commercial Treaties. The Secretary stated that the new division does not indicate an abandonment or weakening of the Trade Agreements program, but that it will carry out important functions in the field of commercial policy in an endeavor to strengthen the work formerly handled by a number of divisions.

Lincoln Memorial Bridge, Washington, D. C.

"Kingmine"

(*Continued from page 4*)

with a 1-in. throw and a 2-in. total travel. Heated air at 750° F. is pulled downward through the coal bed on the Vissac screens by a Sirocco exhauster maintaining a 5-in. water gauge and exhausting at 140° F. Capacity of the Vissac is 100 tons per hour. By bucket elevator the dried coal is elevated to the top of the re-screening plant, thence by shaking Parrish screen is reclassified to 3/16 x 1 in. and 1 x 1⅝-in. sizes.

Returning to the classifying screen which follows the washer, the top section is of 3/16 in. round holes, beneath which is placed a collecting launderer. This 3/16-in. section serves the dual purpose of de-watering the larger sizes and affords wet screening and removal of the minus 3/16-in. coal from the washed minus 5-in. mine run. By gravity flow in a launderer, this water and minus 3/16-in. coal is delivered to the Hardinge hydro-classifier where the minus 48-mesh material overflows to the sludge tank for which, after settling, the coarsest and heaviest particles are dragged to an Eimco filter for dewatering (Fig. 13). The cake which is high ash is discharged into the refuse conveyor.

From the hydro-classifier a thickened 48-mesh by 3/16-in. coal is pumped by hydro-seal pump to a dewatering screen, this consisting of two high-speed mesh screens—one of 48 and one of 20-mesh. The dewatered discharge of coal goes by Redler elevator into two Carpenter centrifugal dryers (Fig. 14). After discharge from these mechanical dryers the coal is carried by flight conveyor to a Link-Belt Roto-Louvre dryer, where it is heat dried down to the desired moisture content. By flight conveyor and Redler conveyor this 48-mesh by 3/16-in. heat-dried coal is delivered to the 75-ton storage bin in the re-screening plant to be loaded or blended into slacks and stoker coals as desired (Fig. 15).

The water and fine coal going through the dewatering screen is returned to the hydro-classifier, so only the overflow of water of the classifier carrying off the minus 48-mesh material to the sludge tank forms the recirculating water to the head tank of the washbox.

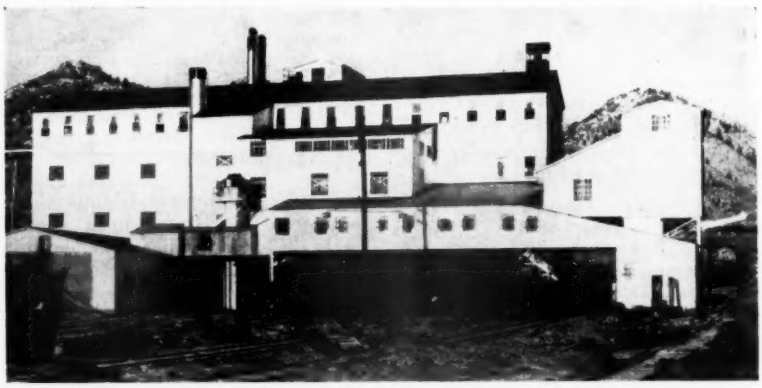
Heated air for the Bissac and Roto-Louvre dryers is generated in a Bigelow-Liptak furnace fed by three Firite stokers, and is delivered to the dryers by blowers or exhaust fans.

Illumination within the plant is provided by numerous steel-sash windows and incandescent bulbs in porcelain reflectors. The storage track yards above and below the tipple are lighted by 18 General Electric sodium-vapor units, each rated at 194 watts.

Push button control of plant operation is from four points—one overlooking the loading booms, one on the washbox floor, one in the re-screening plant and one at the furnace. Magnetic starters are used in nearly all cases, and all wire is enclosed in metal conduit.

A cross conveyor beneath the tracks under the tipple provides for easy clean-up of spilled coal. By elevator and conveyor this clean-up coal goes to the washbox. A grid over conveyor openings on the ground provides that no oversize be handled. Two town supply bins and a railroad coal bin are readily filled by a cross conveyor at the head end of the loading booms.

King Coal, uniformly well prepared and blended in this modern plant, affords intermountain dealers and consumers a bituminous fuel "As They Like it."



PREPARATION PLANT KINGMINE

UNITED STATES FUEL COMPANY, HIAWATHA, UTAH

A Modern Plant From an Old Standard Tipple

***By* McNALLY-PITTSBURG**

Just another example of what McNALLY-PITTSBURG Engineers are doing for the Coal Industry to keep it abreast the March of Progress. Read every word of the able article in this issue of the Journal, prepared by James Casson and G. A. Farnsworth, Engineers, United States Fuel Co., describing this modern mine.

While the design, manufacture and erection of this plant was in our hands, the special McNALLY-PITTSBURG equipment incorporated therein constitutes the "HEART" of the plant and are the outstanding items that have placed Kingmine Coal in its enviable position in the market. These special items are:

THE McNALLY-NORTON AUTOMATIC WASHER

THE McNALLY-VISSAC DRYER

THE McNALLY-PITTSBURG ADJUSTABLE DOUBLE-ROLL PRIMARY BREAKER

THE McNALLY-PITTSBURG STOKER COAL CRUSHER

THE McNALLY-PITTSBURG RESCREENING AND BLENDING PLANT ASSEMBLY

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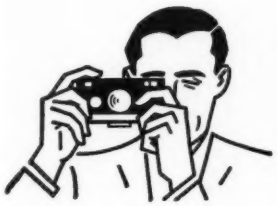
McNALLY-PITTSBURG

DESIGNERS, MANUFACTURERS, AND ERECTORS OF COMPLETE COAL TIPPLES AND WASHERIES



NEWS and VIEWS

Island Creek To Open New Property

Formation of the Marianna Smokeless Coal Company as a wholly owned subsidiary of Pond Creek Pocahontas Company, with a fully mechanized mine and plant with a capacity of over 750,000 tons per year, was announced late in June by James D. Francis, president of Island Creek Coal Company at Pond Creek Pocahontas Company. Complete text of Mr. Francis' statement is as follows:

"The Marianna Smokeless Coal Company, a wholly owned subsidiary of Pond Creek Pocahontas Company, has today executed a lease with the W. M. Ritter Lumber Company for approximately 6,000 acres on the Virginian Railway near Pineville, Wyoming County, W. Va., and will immediately proceed with the development of this property.

"The plant will have a capacity in excess of 750,000 tons per annum, and will be fully mechanically operated. Two mines, with mining plants, villages and stores, will be constructed on the property, and when completed these plants will employ approximately 600 men. The mines will be equipped with the latest model steel tipples, washing and cleaning plants, and will make all sizes of smokeless coal for domestic, steam and industrial use. The inside of these mines will be completely mechanized with the latest type of mechanical loading equipment suitable for this seam of coal. It is expected production will begin around October 1st, and that these mines will be at capacity by the first of the year. The new type of equipment used makes it possible to develop the mines quickly without the long waiting period necessary for development in former years.

"The seam to be mined is the Sewell, one of the best known of the West Virginia smokeless coals. It is a low-ash, high-fusion coal, particularly suitable for domestic, steam, industrial and metallurgical uses.

"The new company is a wholly owned subsidiary of the Pond Creek Pocahontas Company, and will be operated as a unit of the Island Creek organization, and the coal will be sold through Island Creek Coal Sales Company, the main sales offices of which are located in Huntington, W. Va."

Sunshine Bound By Labor Act

Holding that products of the Sunshine Mining Company in the Coeur d'Alene district of Idaho are for ultimate distribution through interstate commerce, United States District Judge C. C. Cavanah held early in July that the company's operations are governed by the fair labor standards act. At the same time he called for testimony on the question of whether lunch periods may be deducted in computing the maximum number of hours for employes.

Declaratory judgment on these points, with which the company is in dispute with the unions, had been asked by the company. The request had been unsuccessfully opposed by the unions and the federal district attorney.

The Sunshine Company contended that since its ore is sold in the same county where it is produced, it does not operate in interstate commerce. The courts held against the company on this point.

The lunch periods at issue total four hours per week per man. In contesting the deduction, the union threatened to bring suit for $20,000 in overtime pay. Pending a settlement of this dispute, the company reduced its working week to five days, but wishes to restore the 6-day week in effect prior to last October.

Anthracite Section Elects Officers

W. H. Lesser, Pierce Management, and Wilmot Jones, Jeddo Highland Coal Co., were elected chairman and vice chairman, respectively, of the Anthracite Section of the American Institute of Mining and Metallurgical Engineers at their annual meeting held in Hazleton, Pa., June 28.

The president of the Institute, H. G. Moulton, and the Woman's Auxiliary were guests who helped make the meeting a decided success.

A motion picture of the anthracite industry, together with a floor show, constituted the program. Three meetings per year are held in the anthracite area, when technical papers are read of outstanding interest to the mining men.

Hecla Developing Montana Property

The Hecla Mining Company has completed sinking 200 ft. to the 300-ft. level of the Heleene mine at Norris, Mont., and plans to run a crosscut from the 300 level to prospect the Red Bird and Birdia veins.

The Blackrock vein in the mine is opened by a 35-ft. shaft which the company will extend another 100 ft., from which lateral prospecting will be done. Earl Hazelwood, of Norris, is in charge of development work for the Hecla concern, of which L. E. Hanley, of Wallace, Idaho, is president and general manager.

Pend Oreille Ore Discovery

Mining of a new ore body, estimated at 100,000 tons or better of a high-grade mill feed, chiefly zinc, was started late in June by the Pend Oreille Mines & Metals Company at its properties in northeastern Washington. As the ore body is near the surface, work will be conducted by open-pit mining.

Existence of the ore as a surface showing was known by Superintendent Lamby for many years, but until recently it had not been drilled for commercial potentialities. It can be mined cheaply by open-pit methods, with truck haulage to the mill.

Mining of this deposit, with attendant reduction of amount of ore that will come from underground operations, will release men working there for further development work in the mine, thus placing the company in further favorable position for long, continuous operation.

Copper Leads Nevada's 1939 Mine Output

Copper displaced gold as Nevada's most valuable mineral product in 1939 but the output did not equal either in quantity or value the mark set in 1937, according to final figures compiled by the San Francisco office of the Bureau of Mines, United States Department of the Interior. Gold production exceeded that for any year since 1916 in quantity and since 1912 in value. The total value of gold, silver, copper, lead, and zinc produced in Nevada in 1939—$30,480,870—exceeded that for each year since 1929, except 1937.

In 1939, 891 lode mines and 104 placer mines produced 361,518 fine ounces of gold valued at $12,653,130; 4,316,029 fine ounces of silver valued at $2,929,668; 133,194,000 pounds of copper valued at $13,852,176; 8,472,000 pounds of lead valued at $398,184; and 12,456,000 pounds of zinc valued at $647,712. In 1938, 795 lode mines and 130 placer mines produced 296,434 ounces of gold valued at $10,375,190; 4,355,471 ounces of silver valued at $2,815,658; 92,338,000 pounds of copper valued at $9,049,124; 9,358,000 pounds of lead valued at $430,468; and 17,880,000 pounds of zinc valued at $858,624.

During 1939 White Pine County continued to be the largest contributor to the mineral output of the state; it ranked first in output of both copper and gold and fourth in silver. Esmeralda County was the leading producer of silver, and Lincoln County the leading producer of both zinc and lead.

Almost three-fourths of the recoverable gold output of Nevada in 1939 was derived from dry ores, chiefly gold ore; copper ore accounted for virtually all the gold from base metal ores; placer gravels yielded 9 percent of the state total gold output in 1939

and were more than twice as productive as in 1938. Five companies, led by Getchell Mine, Inc. (Potosi district, Humboldt County), produced 47 percent of the state's total gold in 1939. Most of the silver production in 1939, as in preceding years, was derived from ores mined chiefly for other metals. Nevada Consolidated Copper Corporation, Consolidated Coppermines Corporation, and Mountain City Copper Co. produced over 98 percent of Nevada's copper output in 1939. Most of the Nevada lead and zinc outputs in 1939 came from Lincoln County, where the Combined Metals Reduction Co. in the Pioche district was the principal producer.

National Safety Competition Winners

Outstanding records of mines and quarries in the prevention of accidents among their employes were recognized by the announcement of the winners in the National Safety Competition of 1939, made by Dr. R. R. Sayers, acting director of the Bureau of Mines, U. S. Department of the Interior. Three hundred and sixty mines and quarries operating in 41 states took part in this contest, conducted by the Bureau of Mines, which was divided into six groups as follows: Anthracite mines, bituminous - coal mines, metal mines, non-metallic mineral mines, open-cut mines, and quarries.

The "Sentinels of Safety" trophies, donated by the *Explosives Engineer* magazine, were awarded to the winner in each of the six groups.

Four bituminous-coal mines, seven non - metallic - mineral mines, seven metal mines, seven open-cut mines and 82 quarries operated during the contest year without an injury that caused an employe to lose time from work.

The trophy for anthracite mines was won by the Eddy Creek (Olyphant Shaft) mine of the Hudson Coal Company. The mine is in Olyphant, Lackawanna County, Pennsylvania and was operated 626,456 man-hours during 1939 with 27 disabling injuries causing 337 days of disability.

The Winton No. 1 mine in Winton, Sweetwater County, Wyo., was awarded the trophy in the bituminous-coal mine group. This mine was operated by the Union Pacific Coal Company for 277,139 man-hours during 1939 without a lost-time accident.

The winner of the trophy in the metal mine group was the Bates iron-ore mine of the M. A. Hanna Company. The mine is located in Iron River, Iron County, Mich., and was operated 187,256 man-hours during 1939 without a lost-time accident.

In the non-metallic mineral mine group, the winner was the No. 5 Limestone mine in Bessemer, Jefferson County, Ala., operated by Tennessee Coal, Iron & Railroad Company for 167,712 man-hours during 1939 without a lost-time accident.

The trophy for the open-cut mine group was awarded to the Scranton iron-ore mine of Pickands, Mather & Company near Hibbing, St. Louis County, Minn., which was operated 259,823 man-hours during 1939 without a lost-time accident.

The Port Inland limestone quarry, operated by the Inland Lime & Stone Company, was the trophy winner in the quarry group. The quarry, located in Mackinac County and the crusher in Schoolcraft County, Mich., worked 458,892 man-hours during 1939 without a lost-time accident.

Minimum Coal Prices Effective September 3

After two years and three months of hearings, studies, and discussion, the Government has announced minimum prices for bituminous coal markets. Director Gray of the Coal Division of the Interior Department determined the effective date of the prices to be September 3, 1940, subject to appeals to Secretary Ickes.

Marketing rules and regulations will become effective simultaneously with the minimum prices.

Completion of the minimum prices brings to a climax approximately seven years of Government effort to stabilize bituminous coal markets.

Producers who are members of the Bituminous Coal Code, and who thereby are participating in the market stabilization plan provided by the Coal Act, may not sell their coal at less than the minimum prices without risk of loss of Code Membership. This, under the law, would subject them to a 19½ percent tax and to the possibility of suit for triple damages by injured Code Member competitors.

Producers who are not members of the Coal Code may sell their coal at any price they desire, but subject to a 19½ percent tax. However, the producers of substantially all of the commercial bituminous coal mined in the United States have become Code members.

The Government's first attempt to stabilize coal markets was made when minimum prices were established under the N. R. A. Bituminous Coal Code in 1933. These were outlawed by the fall of the N. R. A.

In 1935, the Bituminous Coal Conservation Act was passed. This, however, was found unconstitutional, because of its labor provisions, before minimum price schedules could be made effective.

In 1937, Congress next passed the Bituminous Coal Act, which is the present law under which the Government is establishing minimum prices and marketing regulations. The Supreme Court of the United States found this law constitutional in a decision handed down in the Sunshine Anthracite Coal Co. case several weeks ago.

The Government has made two attempts to stabilize the coal industry under the present law. Administration of the Act first was begun in June, 1937, by the National Bituminous Coal Commission. The Commission established minimum prices and marketing rules, but these were revoked in March, 1938, in face of litigation over procedure. Adopting a new procedure, calling for extensive public hearings, the Commission started anew to establish minimum prices and marketing rules in April, 1938. It had promulgated marketing rules and regulations, proposed minimum prices, and ordered final hearings when it was abolished by Presidential Order under the Reorganization Act as of July 1, 1939. The functions of the Commission were transferred to the Coal Division.

Ten cubic yard shovel at the Broken Arrow, Okla., mine of Seneca Coal Company. The dipper stick of this shovel is made of Mayari R, Bethlehem's high strength, corrosion resisting steel, and is the first stick used with this shovel not requiring timbers. Carbon steel dippers which were formerly used had to be filled solid with heavy timber to prevent crushing

On July 24, 1939, the Division took up final hearings on the prices proposed by the Commission. After hearing hundreds of witnesses and accumulating thousands of pages of testimony and exhibits, the Division closed the hearing on January 20, 1940.

In April, 1940, the Examiners filed with Director Gray a 4,000-page report, containing their Findings of Facts and recommended minimum prices. This report was distributed to interested parties and made available to the public. In May, the Director heard the arguments of persons who disagreed with the Examiners and who had filed exceptions. His hearing also offered an opportunity for review of the marketing rules and regulations which had been promulgated by the Commission and of prior phases of the price fixing process.

Schedules of minimum prices for various districts are being issued and copies of all of them will be available for inspection at all offices of the Coal Division and of the Producers Boards immediately after the mailings have been completed.

Leasers Subject To Wage-Hour Regulation

Federal officials connected with the Wage-Hour Division recently rendered a decision in Utah which will probably apply to all the western mining states, resulting in the loss of work of many hundreds of miners now employed in leasing operations.

In the Utah decision, the government informed the State Industrial Commission that mining property lessees come under the provisions of the federal wage-hour statutes and as such must be guaranteed minimum wages. An earlier opinion of the Utah Supreme Court upheld the industrial commission's ruling that lessees are employes of the mining companies granting the leases. Enforcement of this ruling leaves no course open to mining companies other than cancellation of the leases, with additional unemployment and reduction of mineral output as the result.

The United States Smelting, Refining & Mining Company has posted notices terminating leases of some 200 to 250 miners whose leases expired July 1. It is estimated that from 1,000 to 1,500 Utah miners would be thrown out of employment under the arbitrary ruling of the Division.

Just Reports On Tri-State Mine Waters

A report on recent investigations concerning Tri-State mine water discharges in their effect on fish life of streams in the area was issued recently by Evan Just, of Miami, Okla., secretary of the Tri-State Zinc and Lead Ore Producers Association. Text of the report is as follows:

"Because a large number of young fish of all kinds have appeared in great quantities below the dam on the Neosho River at Miami and below the Lowell Dam at Riverton, Kans., there has been a recurrence of gossip that our mine water discharges are killing fish in this area.

"Our mining industry believes that these charges or inferences are without foundation. We are making a sincere effort to get at the facts, as the mining industry fully realizes that if fish are being killed as a result of its operations, this condition must be corrected.

"We are uncertain why fish seem to be fleeing from the Grand River Lake area upstream. There can be nothing to the suggestion that the pressure of the deepening waters of Grand River Lake is too great for the fish. Fish can accommodate themselves to water of any pressure if they do not change their depth too quickly, and the lake contains a great abundance of shallow water where these small fish can stay if they prefer shallow water.

"The best guess that we can hazard is that the waters of Grand River Lake are being deoxygenated or acidified by decay of trees, leaves and other vegetable debris that were left in the reservoir area and are now under the lake. The lake water could be easily analyzed to find out if this is true.

"Any condition on Neosho River certainly cannot be ascribed to our mine water discharge. Only one mine is pumping into waters that reach Neosho River. These waters are being discharged into Elm Creek and game fish are living in the pond at the discharges of the pumps. The circumstances that the fish are dying below the Lowell Dam completely above any of our mine water discharges, indicates that the root of the present problem is not connected with our industry.

"It is perfectly evident that some mine waters being discharged into Spring River near Baxter Springs react with the river to produce a red precipitate of iron hydroxide. Some of this precipitate, which ordinarily settles out during the first mile of flow, is carried down to Oklahoma by surges of water created when the turbines at Lowell Dam are put into service. Spring River is sufficiently alkaline to neutralize completely any acidity created by our mine waters, and the river below Baxter Springs still contains an excess of alkalinity. Therefore, it is perfectly evident that no acidity is being created by our mine waters which would harm fish.

"The precipitate is harmless. In the office of our association we have had an aquarium for the past six weeks, wherein fish are being subjected to 20 times the amount of precipitate that can be found in any of our streams. The precipitate seems to have no harmful effects upon the fish at all. Furthermore, it is well known that people are catching fish all along Spring River.

"We are at a loss to explain the numerous rumors of fish being found dead along the course of Spring River east of Miami. The only explanation we can offer is that there may be some occasional dynamiting of fish, and the mining industry gets the blame for the dead fish which are observed as a result of this practice.

"In any event, whether this is true or not, the mining industry is interested in finding out the true facts with reference to our fish life, and will take active steps to prevent any conditions created by it if it can be shown that these conditions kill fish."

Consumers Urged To Buy Coal Now

Although the bituminous coal industry has ample production capacity to meet any additional consumer demands that may be put upon it as a result of the national defense program, consumers today were advised by the Consumers' Counsel Division, Office of the Solicitor, Department of the Interior, to put in fall and winter coal now so as to lessen any loads that may be put upon the nation's transport system in the fall and winter months by the defense program.

The text of an article in the June issue of the *Coal Consumers' Digest*, published by the Consumers' Counsel Division, follows:

"Domestic and industrial consumers of bituminous coal can assist the national defense program and themselves by filling their winter fuel requirements now and during the later summer months.

"Customary summer prices for sized coals are in effect. Because the presently developed capacity of the industry is in excess of 575,000,000 tons annually as compared with a present consumption of less than 450,000,000 tons, no basis for a general sharp price increase is in sight.

"However, it should be borne in mind that increased production of planes, tanks, guns, chemicals, battleships and other materials needed in the defense program will be getting into full swing in the fall, which is a time when the coal industry regularly turns to increased production of domestic sizes of coal. Household consumers and others can guard against temporary local scarcities in domestic sizes or particular qualities of coal which may result from seasonal peak demands occurring at a time when the transportation system will be heavily burdened by movement of industrial coal, other defense materials and crops. Such a condition occurred during 1917-18. Repetition can be prevented by consumer cooperation in purchasing and by coordination of transportation such as has already been provided for by the President in the National Defense Advisory Commission.

"It is usually to the advantage of domestic consumers to purchase and store winter coal stocks during summer months when demand is low and prices are generally lower than during the burning season. Demand is brisker than at this time last year. A tendency toward firmer prices may develop in the fall, although it should be neither general nor sharply above minimum prices set by the Bituminous Coal Division.

"When the European war started in September, 1939, the coal market stiffened. Local shortages on certain sizes in some markets occurred for brief periods and price quotations rose. As demand and shortages subsided quickly, prices fell.

"Last year's price flutter was caused mostly by heavy movements to lower lake ports and lack of rolling stock on roads serving those ports in the few weeks of heavy movement. With the closing of lake shipping, normal demand and prices of coal were resumed.

"The coal industry, being basic, must carry a tremendous burden in the defense program. Consumers can help by placing orders now, and, when practicable, taking delivery now for storage, thus stimulating production and transportation of a substantial part of next winter's fuel supply during the summer, before industry and agriculture put peak loads upon rolling stock and rail movement."

New Arizona Tungsten Concentrator In Operation

The new 100-ton concentrator recently completed by the Continental Mining Corp. at the Williams tungsten mine, 72 miles southeast of Kingman, Ariz., started operations in July.

A considerable tonnage of ore, taken from a 400-ft. adit which former operators ran in on the vein, has been accumulated in advance. About 45 men are employed by the company in mining development and mill construction, the principal development comprising the driving of a 1,000-ft. drift crosscut tunnel to cut the main vein under the old workings at a vertical depth of 220 ft.

PETER F. LOFTUS

Consulting Engineers

ENGINEERING AND ECONOMIC SURVEYS, ANALYSES AND REPORTS ON POWER APPLICATIONS AND POWER COST PROBLEMS OF THE COAL MINING INDUSTRY

Oliver Building **Pittsburgh, Pa.**

Fourth Annual Coal Conference At W. V. U.

D. L. McElroy, director of the West Virginia University School of Mines, recently announced that October 18 and 19 have been selected as the dates of the fourth annual West Virginia Coal Conference.

The conference, to be held at Morgantown, is sponsored jointly by the University School of Mines and the West Virginia Coal Mining Institute. An added feature this year is the fact that the West Virginia Society of Professional Engineers will meet in Morgantown on October 17, 18, and 19.

Mr. McElroy said plans for the conference already are under way and that the program is being worked out by a committee appointed by C. W. Connor, of Nellis, president of the Coal Mining Institute. This committee is composed of W. E. E. Koepler, of Bluefield, secretary of the Pocahontas Operators Association; J. V. Sullivan, of Charleston, secretary of the West Virginia Coal Association; and Mr. McElroy.

Among the speakers already listed are Dr. C. E. Lawall, president of West Virginia University; Byron M. Bird, Battelle Memorial Institute, Columbus, Ohio; C. E. Lesher, president of the Pittsburgh Coal Carbonization Company, Pittsburgh, Pa.; George R. Delameter, vice president of the W. S. Tyler Company, Cleveland, Ohio; Dr. Paul H. Price, state geologist; and W. W. Hodge, head of the department of chemical engineering at West Virginia University.

M. L. O'Neal, of Huntington, is president of the West Virginia Society of Professional Engineers, and Robert Williamson, Jr., of Charleston, is secretary.

The football attraction on the occasion of these meetings will be the annual West Virginia-West Virginia Wesleyan game at Mountaineer Field in Morgantown, on October 19.

Significance of Diesel Exhaust Gas Analysis

In an investigation by the Bureau of Mines of the hazards that might attend the use of Diesel engines underground, the composition of the exhaust gases from two 4-stroke cycle, 4-cylinder Diesel engines in proper mechanical condition has been determined by precise analytical methods for fuel-air ratios ranging from approximately 0.01 to 0.09 pound per pound. The significance of these results in relation to combustion in the Diesel engine is discussed in a paper presented by John C. Holtz and M. A. Elliott, before the Oil and Gas Power Division of the American Society of Mechanical Engineers at its meeting at Asbury Park, N. J., June 12-22.

The variation of exhaust gas composition with fuel-air ratio indicates that combustion was essentially complete when excess air was present. When the two engines were operated in their normal range of fuel-air ratios the concentration of carbon monoxide never exceeded 0.12 percent, and hydrogen and methane were never present in significant concentrations.

Despite such low concentrations of carbon monoxide it was observed that the concentration of this gas was affected not only by fuel-air ratio but also by engine design, and to a slight extent by factors that varied with engine speed. In tests of both engines the concentration of carbon monoxide reached a minimum at a fuel-air ratio of approximately 0.03 pound per pound.

Aldehydes, which are intermediate products formed in the direct oxidation of hydrocarbons, were present in the exhaust gases from both engines. The concentration of these compounds never exceeded 31 parts per million and tended to increase as the fuel-air ratio was decreased. Preliminary studies have indicated that aldehydes may be partly responsible for the so-called acrid exhaust from Diesel engines.

Throughout the normal operating range of both engines, free carbon was collected on filter paper through which exhaust gas was passed. Under these conditions the final exhaust generally was clear, although the calculated quantity of free carbon in the exhaust gas from one of the engines ranged from 2 to 6 percent by weight of the fuel. Free carbon in the exhaust increased rapidly at fuel-air ratios greater than the maximum ratio in the normal operating range, and when the concentration of free carbon reached approximately 0.3 pound of carbon per 1,000 cubic feet of exhaust gas, smoke was easily noticeable.

In the normal operating range of one engine the potential heat lost in the products of incomplete combustion was between 1.5 and 5.5 percent of the energy in the fuel. Such low losses might not be detected unless precise methods of analysis were used to determine the products of incomplete combustion.

Alaska Mine Expands Work

Further expansion of housing facilities for employes of the Alaska Pacific Consolidated Mining Company at the Independence mine camp at the Willow Creek district was planned late in June.

The newest addition to the already large group of camp buildings will comprise a modern three-story dormitory, with recreation room large enough for use in showing moving pictures. Construction of the new building was made necessary by the steadily expanding activities at the mine, present facilities being inadequate to meet the requirements of the large number employed at present and in prospect. The company had more than 150 men on the payroll last summer, and the number is again mounting after a seasonable force decrease during the winter.

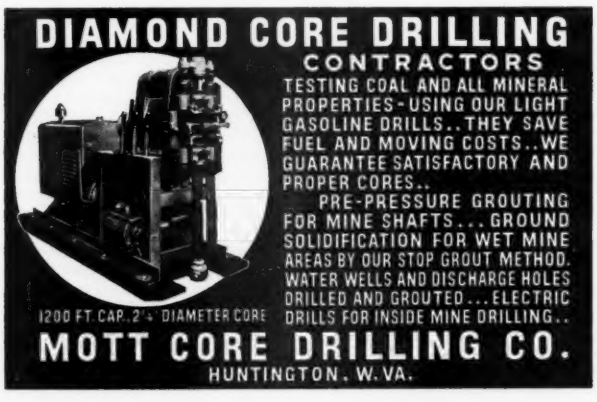
W. W. Stoll, general manager of the Independence, was expected back in Alaska in July, following a trip through the States.

Freezing Project Successful By U. S. Smelting

Ground is being frozen as well as thawed in the course of mining operations by the United States Smelting Co. near Fairbanks, Alaska. The freezing is being done at Cripple Creek to stabilize the dredge-cut banks, which, from the bottom to top, range in height from 50 to 100 ft.

The freezing project was started last year, and comprises the forcing into the ground of an ammonia freezing solution. During the past winter, cold atmospheric temperatures operated to the advantage of the work; and during the summer, equipment utilizing the principle of a refrigerator machine is used to hold a frozen depth gained during the winter months. With frozen banks, no timbering is necessary, and all danger of cave-ins in the dredge cut is obviated. The project gives every promise of being a complete success.

Thawing of frozen ground has been a necessary process ever since gold was discovered in the northland, but freezing of thawed ground, as prosecuted at present by the U. S. Smelting Co., is an innovation—the first instance of its kind in the mining industry.



Mining in Alaska in 1939

Mines in Alaska produced minerals worth $25,296,000 in 1939, as against $28,607,000 in 1938, according to an announcement by the Geological Survey, United States Department of the Interior. The total value of the mineral output of the territory since 1880 is $803,114,000, or nearly 112 times the price paid to Russia for the entire territory at the time of purchase in 1867.

Some of the significant facts concerning the Alaskan mineral industry in 1939 may be summarized as follows:

The total value of the minerals produced from Alaska mines in 1939 was greater than in any other year except the four years of the World War period (1915 to 1918) and in 1937 and 1938. In the years of the World War the annual mineral production included a copper output ranging in value from $15,000,000 to $29,000,000 a year; in 1937 the copper output was valued at $4,741,000; and in 1938 at $2,976,000.

The decrease in the value of the mineral output of the territory in 1939 as compared with 1938 may be attributed largely to the practical cessation of copper mining, which in the earlier year yielded copper to the value of $2,976,000.

The value of the gold produced from Alaska mines in 1939 was greater than in any other year in the entire history of mining in the territory. Value of placer gold has been exceeded previously in only three years, and the value of the lode gold has been exceeded in only two years.

The quantity and value of the platinum metals produced from Alaska deposits in 1939 was greater than in any preceding year with the exception of 1938, and far exceeds the production of these metals from any other part of the United States or its possessions.

Coal mined in Alaska in 1939 amounted to 146,250 tons, which is next to the largest amount ever taken from its deposits in a single year.

General conditions affecting the Alaska mining industry in 1939 seem to have been essentially normal, so that there is no reason to believe that the present rate of production marks merely a temporary high level that will not be attained again soon. Instead, except for reasonable fluctuations, it seems to be a level that will be maintained or even bettered when some of the projects already under way come into production.

The following table shows the value of the mineral output of Alaska for 1939 and, for comparison, the production of the same materials in 1938.

VALUE OF MINERAL OUTPUT OF ALASKA IN 1939 AND 1938

	1939	1938
Gold	$23,279,000	$23,170,000
Silver	138,000	307,000
Copper	30,000	2,976,000
Lead	106,000	105,400
Platinum metals	997,000	1,229,300
Tin, metallic	37,300	89,100
Coal	585,000	620,900
Miscellaneous mineral products, including antimony, limestone, quicksilver, etc.	123,700	109,300
	$25,296,000	$28,607,000

In all the computations of value the average selling prices for the year have been used, rather than the prices actually received by the producers.

Montana Miners Meet in Helena

The Mining Association of Montana will hold its sixth annual convention in Helena August 9 and 10, with talks on technical and economic mining problems by Cornelius F. Kelley, chairman of the board of the Anaconda Copper Mining Company, and Senator B. K. Wheeler featuring the meeting.

The detailed program was planned by representatives of the Last Chance Gulch Mining Association and the Helena Chamber of Commerce. Mr. Kelley will deliver his address at the banquet.

Other talks will be given by Dr. E. D. Gardner, of the U. S. Bureau of Mines; Dr. Francis A. Thomson, president of the Montana State School of Mines; John L. Boardman, chairman of the safety board of Anaconda Copper Mining Company; A. Strojan, Jr., of Helena, superintendent of the Winston Brothers gold-dredging operations; and an official of the Securities and Exchange Commission.

An entire session will be devoted to a discussion of the wage and hour act, led by Arthur L. Faber, of Washington, D. C., representing Philip B. Fleming, administrator of the wage and hour act.

Plans for the meeting were announced by Carl J. Trauerman, of Butte, president of the Association.

Diamond Drill Exploration in Tri-State

The Eagle-Picher Mining and Smelting Company has launched a drilling program, utilizing diamond-bit coredrills, to explore formations several hundred feet below the present ore-producing horizon in the Miami-Picher trough. Initial operations were started late in June at the Blue Goose mine, according to an announcement by S. S. Clarke, of Miami, general mine superintendent of the company.

A light, newly designed Sullivan drilling machine, mounted on a movable steel frame, is being utilized by the Jones Diamond Drilling Company, who have contracted for the work. A special bit, with chipped diamonds set in a hard-metal alloy, bores a 1⅛-in. core, the machine being powered by compressed air.

Some diamond drilling was done in the Tri-State district in the past, but at that time it was too expensive for the results obtained. Recent improvements in the design of drill machines, together with advancements made in manufacture of bits at considerable less cost, have made this type of exploration work more practical.

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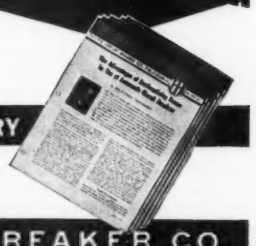

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— BOOK REVIEWS —

SILICOSIS—*Proceedings of the International Conference held in Geneva, August 29-September 9, 1938. Geneva, 1940. Distributed in the United States by the Washington Branch of the International Labor Office, 734 Jackson Place, Washington, D. C. 223 pages.* $1.25.

Drawing a distinction between silicosis and other lung afflictions, expert opinion compiled by the International Labor Office at Geneva, Switzerland, is agreed that X-ray alone cannot determine the extent to which the dust disease has incapacitated a worker, according to this report by the International Labor Office of its Second International Conference on Silicosis, which met in Geneva August-September, 1938. Among the medical authorities assembled from nine principal industrial countries were: Dr. R. R. Sayers, chief of the Division of Industrial Health, United States Public Health Service; Dr. Leroy U. Gardner, director of the Saranac Laboratory for the Study of Tuberculosis; and Dr. L. Greenburg, executive director of the Division of Industrial Health, New York State Department of Labor.

Specially trained physicians, equipped with X-ray facilities, are needed for the satisfactory diagnosis of early silicosis, the conference found. But, it was added, "radiological findings do not necessarily bear any definite relation to the degree of incapacity."

"In evaluating incapacity," the report continues, "due to the occupation it is also desirable to have regard to the dust exposure, dust concentrations, duration of the exposure and to the influence that this dust may have had on the particular worker. The presence of other diseases and their influence on the applicant's general condition must also be assessed.

"The degree of incapacity is incapable of being expressed in exact percentages."

Since the first international silicosis conference, called by the International Labor Office at Johannesburg in 1930, "marked progress" has been achieved in the field of research, according to the report; similarly, "much has been achieved in recent times in the recognition of the danger of dust, as evidenced by various laws and regulations that have been introduced to control dust." More than 45 countries now list silicosis in their workmen's compensation legislation.

No cure for silicosis or means of stimulating the elimination of silica from lungs have yet been discovered, the authorities report. In the field of prevention, they agreed that only the elimination of dust from working environments was effective. Masks and other devices are recommended only when suppression of dust at its source is impossible.

The publication contains texts of special papers presented to the conference, in one of which Dr. Gardner (in collaboration with Dr. Thomas M. Durkan) reported favorable results in experiments to demonstrate that neutral rock dusts minimize the effect of silica. A second paper, by Dr. Sayers, recounted the results of an inquiry into anthraco-silicosis among hard-coal miners in which, among other points, it was revealed that age is not a controlling factor in silicosis.

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HISTORY OF UNION PACIFIC COAL MINES, 1860 TO 1940. *The Colonial Press, Omaha, Nebr.* 1940. *Pages* 265 and *xliii. Available either from The Union Pacific Coal Co.,* 1416 *Dodge St., Omaha, Nebr., or Rock Springs, Wyo. Price* $1.40 *postpaid.*

This recent publication portrays the drama covering 72 years of pioneering in the deserts and canyons of Wyoming, Colorado and Utah, and the forest beauty of Washington State by an adventurous and stout-hearted people who have made secure the fuel supply of one of the most strategic railroads on our continent. Through the work of exploration, reconnaissance, location and construction of the Union Pacific Railroad, the hopes, ambitions and struggles of loyal men and women are recorded, with the major portion of the volume devoted to the history and accomplishments in the many coal mining fields established for the procurement of a dependable fuel to replace the cord-wood used in locomotive fire boxes in the construction days.

Ever driving on for progress since the days when the completion of the railroad cemented California and the Far West to the sisterhood of the States, the personnel of this coal company has in recent years attained remarkable performance in reducing accidents and in mechanizing its mining and loading processes. Of compelling attention is the recitation of the reduction in accidents over a period of 10 years to one-seventh of the former recorded injuries. Such a performance points the way for the balance of our country's coal mines and is but another pioneering demonstration of the value of genuine educational effort in safety work.

The story of the employment of the Chinese miners in the Wyoming coal mines is particularly the Union Pacific Coal Company's own. The narrative of Chinatown, the groups of Chinamen walking in single file, the Chinese boss-man, Ah Say, the joss house, the massacre, the arrival of regular troops, as well as the adventures of the Orientals with each fresh batch of mine mules imported from Missouri, have a flavor unknown to any other coal mining district.

Throughout the pages of the story of adventure and accomplishment runs the humane and just consideration of men for other men and their families, and the fine loyalty which reaches its high point in the activities of the Union Pacific Old Timers Association which holds annual meetings in its own building in the headquarters town of Rock Springs, Wyo.

PUBLICATIONS OF INTEREST

U. S. BUREAU OF MINES

MINER'S CIRCULAR 41. ACCIDENTS FROM FALLS OF ROCK OR ORE IN METAL MINES, by E. H. Denny. 20 pp. 2 tables. 5 cents.

T. P. 603. PHENOMENA IN THE IGNITION OF FIREDAMP BY EXPLOSIVES, by S. L. Gerhard and Wilbert J. Huff. 17 pp. 12 figs. 10 cents.

T. P. 604. CARBONIZING PROPERTIES AND PETROGRAPHIC COMPOSITION OF POCAHONTAS NO. 3-BED COAL FROM BUCKEYE NO. 3 MINE, WYOMING COUNTY, W. VA., AND OF POCAHONTAS NO. 4-BED COAL FROM NO. 4 MINE, RALEIGH COUNTY, W. VA., by A. C. Fieldner, J. D. Davis, D. A. Reynolds, L. D. Schmidt, R. E. Brewer, G. C. Sprunk, and C. E. Holmes. 65 pp. 44 figs. 15 cents.

T. P. 609. BENTONITE: ITS PROPERTIES, MINING, PREPARATION, AND UTILIZATION, by C. W. Davis and H. C. Vacher, revised by John E. Conley. 77 pp. 2 figs. 15 cents.

T. P. 613. DEVELOPMENTS IN COAL RESEARCH AND TECHNOLOGY IN 1937 AND 1938, by A. C. Fieldner. 88 pp. 10 cents.

R. I. 3469-R. PROGRESS REPORTS—METALLURGICAL DIVISION—32. ORE-DRESSING STUDIES, by F. D. DeVaney and S. M. Shelton. 25 pp. 4 tables. 18 figs.

R. I. 3506. STUDIES OF ROOF MOVEMENT IN COAL MINES—3. GIBSON MINE OF THE HILLMAN COAL & COKE CO., by E. R. Maize, Edward Thomas and H. P. Greenwald. 9 pp. 5 figs.

R. I. 3508. DEISEL ENGINES UNDERGROUND—1. COMPOSITION OF EXHAUST GAS FROM ENGINES IN PROPER MECHANICAL CONDITION, by John C. Holtz, L. B. Berger, M. A. Elliott, and H. H. Schrenk. 47 pp. 10 figs.

R. I. 3510. CUSHIONED BLASTING—1. ORIENTING STUDIES, by A. R. T. Denues. 25 pp. 4 tables. 2 figs.

R. I. 3512. CONTRIBUTIONS TO THE ART OF SMELTING LEAD PRODUCTS, by Virgil Miller, R. Bainbridge, and R. Ellison. 12 pp. 5 tables.

I. C. 7115. CABS FOR TRANSPORTING EXPLOSIVES, by C. W. Owings. 6 pp. 6 figs.

I. C. 7119. MINING AND MILLING METHODS AND COSTS AT THE ASH PEAK MINE OF THE VETA MINES, INC., DUNCAN, ARIZ., by Herbert L. Lines. 26 pp. 3 figs.

I. C. 7120. FATALITIES CAUSED BY ELECTRIC CONTACTS IN ALABAMA COAL MINES, 1925-39, by Frank E. Cash. 20 pp.

I. C. 7122. NOVEL DEVICE FOR COLLECTING AIR SAMPLES IN INACCESSIBLE PLACES, by W. J. Fene. 2 pp. 2 figs.

FOREIGN MINERALS QUARTERLY, Vol 3, No. 2. Mineral Resources, Production, and Trade of Chile. 80 pp.

MISCELLANEOUS

GEOLOGY AND METALLIFEROUS DEPOSITS OF KOOTENAI COUNTY, IDAHO, by Alfred L. Anderson, Idaho Bureau of Mines and Geology, Pamphlet No. 53. 67 pp. 17 figs. 1 map. Prepared in cooperation with the U. S. Geological Survey.

OUTLOOK FOR FURTHER ORE DISCOVERIES IN THE LITTLE HATCHET MOUNTAINS, NEW MEXICO, by Samuel G. Lasky, New Mexico School of Mines, Circular No. 7. 31 pp. 6 figs.

SOME STRUCTURAL FEATURES OF THE NORTHERN ANTHRACITE COAL BASIN, PENNSYLVANIA, by N. H. Darton, U. S. Geological Survey Professional Paper 193-D. 80 pp. 19 figs. 50 cents.

PERSONALS

R. C. Allen, vice president of Oglebay, Norton & Co., Cleveland, has been appointed advisor on manganese and chrome ores to assist Edward R. Stettinius, Jr., director of the raw materials division of the National Defense Advisory Commission.

Other specialists in the strategic minerals group, headed by Dr. C. K. Leith, of the University of Wisconsin, include **H. K. Masters**, tungsten and antimony; **Erwin Vogelsang**, tin; and **H. C. Sykes**, mica.

Walter S. Tower, president of the American Iron and Steel Institute, is chief consultant for steel.

John M. Price, for the past five years vice president of the Ferro Machine and Foundry Company, Cleveland, was recently elected president of that corporation, succeeding the late **James F. Leitch.**

For many years Mr. Price held responsible positions for mining companies on the Michigan iron ranges, and served as foreign representative for Oglebay, Norton & Co. in the U. S. S. R. from 1929 to 1932. He served as vice president of the Ferro Machine Company for five years preceding his recent promotion.

Arthur Waldman has been appointed to the newly established position of assistant general superintendent of the Coal Mines Division of the Tennessee Coal, Iron and Railroad Co. Mr. Waldman will be succeeded in the latter position by **Hugo C. Nyquist**, formerly superintendent of the Docena coal mine.

Succeeding Mr. Nyquist at Docena is **Woods G. Talman**, formerly division industrial engineer. Mr. Talman, a civil engineering graduate of Virginia Military Institute, entered the service of the Tennessee Company in June, 1937, as a junior engineer at Hamilton.

George W. McCaa, a mining engineering graduate of Lafayette College, will succeed Mr. Talman as industrial engineer. All promotions were effective July 1.

W. S. McKee has been appointed assistant treasurer of Jones & Laughlin Steel Corporation, effective July 1. Mr. McKee has been with J. & L. for several years as credit manager.

J. B. Haffner has resigned as general manager of the Consolidated Coppermines Corp. at Kimberly to accept a similar position with the Bunker Hill & Sullivan Mining Co. of Kellogg, Idaho.

Mr. Haffner will be succeeded at Consolidated Coppermines by **Cassius Cook**, who was his assistant when he first took over the management.

J. D. Francis, president of Island Creek Coal Company, has been elected a director of the United States Chamber of Commerce, representing the Natural Resources Department.

C. W. Peterson has been promoted to the post of vice president and treasurer of Bell & Zoller Coal Company, succeeding **O. M. Gordon**, resigned.

Mr. Peterson, former secretary, has been with the Bell & Zoller organization since the inception of his business career, and has become a well-known figure in the Illinois coal industry during recent years.

Herbert J. Jacobi, vice president and general counsel of Carter Coal Co., has resumed the practice of law, joining the firm of Rand, French & Carpenter at 64 Wall Street, New York. In his Carter connection he has taken a continuously active part in the Washington proceedings preliminary to expected adoption of minimum bituminous coal prices. Mr. Jacobi has resigned as vice president of Carter Coal Co., but continues as general counsel.

Wesley Harris, president of the Bicknell Coal Co., and manager of its property at Bicknell, Ind., resigned at a recent meeting of the board of directors, the resignation having become effective July 1.

Earl K. Nixon, director of the Oregon State Department of Geology and Mineral Industries, was granted a temporary leave of absence of 60 days, during which he has undertaken consulting work in South America. During his absence, **F. W. Libbey**, staff mining engineer, has been in charge of the department.

J. F. Caulfield was elected president of the Elk Horn Corporation at a recent meeting of the Board of Directors, succeeding the late **Senator C. W. Watson.** Mr. Caulfield has been vice president and treasurer of the company since 1919, and a well-known figure in the coal industry during the past 38 years.

—Obituaries—

William Koerner, general manager of the Magma Copper Co. since 1925, and one of the nation's leading mining engineers, died at Portland, Oregon, June 30, at the age of 54.

Mr. Koerner was credited with inaugurating the vacation-with-pay system for miners in Arizona, together with group insurance for all employes, and he was also the first to install a mine cooling system for the comfort of the men.

M. W. Horgan, mining engineer for the Monongahela System and one of the most widely known coal men in Pennsylvania, died suddenly June 13 in Fairmont, W. Va. His age was 53. Death was due to a heart attack.

Mr. Horgan was one of the founders of the Monongahela Valley Coal Mining Institute, and for many years served as a vice president of that organization. He also was a vice president of the Central West Virginia Coal Mining Institute and one of the leaders in its activities. He has long been identified with the work of the American Mining Congress Coal Division, and was the first chairman of the Power Committee.

Joseph R. DeBardeleben, prominent figure in the early history of the coal industry in the Birmingham district, died in Birmingham, Ala., June 22, following an extended illness. His age was 82.

Louis H. Metzgar, manager of Alaska Juneau Gold Mining Company, died recently in San Francisco.

Charles E. Bockus, widely known coal operator in the United States, died June 28, at the age of 72. At the time of his death, Mr. Bockus was president and chairman of the board of directors of the Clinchfield Coal Corp. and chairman of the board of the Clinchfield New York Corp. He was also a director of the National Coal Association from the time of its organization, and served as president for five years and treasurer for a similar period.

A. W. Evans, well known mining engineer in the coal industry, died in Knoxville, Tenn., July 3. His age was 70. During his active life he served in an advisory capacity for many mining operations, and was a strong advocate of first-aid training in mining. He was a regular contributor to coal trade journals, and was credited with the invention of the automatic drop-bottom mine car.

William H. Lindsey, of Nashville, Tenn., president of the Crescent Coal Company and past president of the American Mining Congress, died suddenly on July 27. He was well known in southern mining and financial circles, and an ardent worker for the industrial development of the South.

Howard B. Riley of Philippi, W. Va., vice president of the Central West Virginia Coal Mining Institute and representative for Mining Congress Journal in northern West Virginia, died July 15 following an extended illness. Mr. Riley was active in the work of the Institute and was a director of the safety meet held last fall at Jackson Mills, W. Va.

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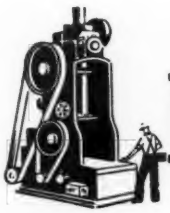


MANUFACTURERS' Forum

New Electrode Pamphlet

An entirely new pocket-size pamphlet covering the Murex line of electrodes for arc welding has just been published by the Metal & Thermit Corporation, 120 Broadway, New York, N. Y. The new pamphlet gives complete data on physical properties, chemical analysis, qualifications, approvals and recommended procedures for all Murex mild steel welding electrodes, as well as similar but briefer information on Murex alloy steel electrodes. Copies may be had on request to the manufacturer.

New 1 to 1-1/4 Yard Shovel

A new, powerful 1 to 1¼ yd. convertible shovel-dragline-crane, Model LS-100, is announced by Link-Belt Speeder Corp., 301 West Pershing Road, Chicago, Ill. Claimed for this new model are several advancements, including a combination of outstanding features of other Link-Belt and Speeder models.

The machine is controlled by easy-throw levers and equipped with a new type of clutch, said to produce results never before attained by friction

clutches—a booster system that actually does give the "feel" of the load at all times.

Further features are: fully enclosed travel brakes controlled from cab; fully enclosed traction gears running in oil; a 72-in. diam. machine-finished roller-path turn table with patented, self-aligning rollers; anti-friction bearings throughout; free floating center-pin bearings; and welded steel design for strength and resistance to shock loads and to provide positive alignment of machinery parts.

The manufacturer particularly stresses sturdy construction in this new 1-1¼ yd. machine. The engine is a heavy-duty industrial type gasoline or Diesel, of a size usually only found in larger units. Track shoes are 24 in. standard (30 in. optional); crawlers are smooth, self-cleaning and perfect guiding.

The machine may be quickly converted from one excavating or handling attachment to another, without mechanical alteration.

Complete details of the new LS-100 may be obtained by addressing Link-Belt Speeder Corp. direct or by contacting any Link-Belt Speeder distributor.

Improved Small Strain Clamp Easier to Install

Several improvements have been incorporated in its smallest strain clamp, known as the Baby Universal, by the Ohio Brass Company, Mansfield, Ohio. These changes make the clamp easier to install, increase its holding power, permit accurate conductor alignment and add to the mechanical strength, it is claimed. The nose of the clamp has been extended beyond the clamping portion to form a loop which serves as a convenient anchorage for the hook on the block and tackle normally used for sagging line conductors. This feature simplifies installation since the conductor can be pulled to sag with the clamp in place, and it also permits more accurate sagging because the line of pull is coincidental with the final conductor position. To give the lengthened clamp additional strength, a reinforcing rib has been inserted in the middle of the body casting. With the extended nose the clamp has a longer V groove which provides a better grip of the cable.

Only one wrench is needed to install this clamp because two lugs are provided on the main body casting to prevent the head of the bolt from turning when the nut is being tightened. However, the lugs are so arranged that a wrench can be used to hold the bolt head if desired. To permit the development of greater holding power, a machine bolt has been substituted for the carriage bolt used in the older design. To accommodate this additional pressure, the keeper piece, in turn, has been made heavier. A ridge in the main casting engages the unused conductor groove of the reversible keeper piece, preventing the keeper piece from turning when being tightened and assuring a snug fit over the conductor. The Baby Universal, smallest of three Universal strain clamps, accommodates 0.145 to 0.350-in. conductors. All parts are hot-dip galvanized to prevent corrosion.

MI-9 Metal-Clad Features Completely Insulated Buses

Important design improvements, announced coincident with a material price reduction on MI-9 metal-clad switchgear, by the General Electric Company, concern industrial plants and public buildings. All buses and connections are now completely insulated: the main bus is covered with a molded insulation having a dielectric strength greatly in excess of the 5,000-volt rating of the equipment; all bus connections are covered with two-piece molded covers, which are filled with compound. As in previous models, silver-to-silver, high-pressure contacts minimize oxidation of contact surfaces.

A screw-jack mechanism, which is built into the housing, raises and lowers the breaker. This can be manually or electrically operated. Mechanical interlocks, removable breakers, and isolated current transformers, buses and connections are also retained as features.

Type MI-9 uses a G-E circuit breaker employing the oil blast principle of circuit interruption. The primary disconnecting devices are of the stud-and-socket type, with silver-to-silver, high-pressure line contacts. Stationary sockets are mounted in glazed, wet-process porcelain; movable contacts are the oil-circuit-breaker studs. Secondary disconnecting devices automatically connect or disconnect all the secondary connections when the breaker is raised or lowered

in the housing. But making and breaking the circuit is always done by the breaker, for mechanical interlocks prevent disconnecting or reconnecting the breaker while it is closed.

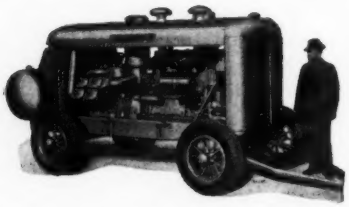
The breaker can be easily lowered by the built-in screw-jack mechanism onto a transfer truck and moved to a rack for inspection. Service interruptions during inspections are thus limited to the brief interval necessary to remove one breaker and replace it with another. An accessory inspection rack provides maximum accessibility for servicing, and every facility for electrical or mechanical operation of the breaker while it is removed from its housing.

MI-9 switchgear is available for the protection of circuits up to 5,000 volts and 50,000 kva.

Portable Compressor

A new portable compressor delivering 500 cu. ft. per minute (actual) at 100 lbs. pressure was recently announced by Ingersoll-Rand Company. Known as the K-500, this machine is now the largest in their line of two-stage, air-cooled units, and weighs only 10,600 lbs.

Features of this new portable compressor include: choice of either an oil engine or a new-type 6-cylinder gasoline engine which does not require high-grade motor gasoline, replaceable



cylinder liners for engines, and a patented automatic fuel saver which changes the engine speed according to the use of compressed air.

The manufacturer offers this new unit with either wheel or skid-mounting.

More detailed information, including charts showing the savings made possible by this new portable compressor with automatic fuel saver, is contained in Form 2641. Copies are available from Ingersoll-Rand Company, 11 Broadway, New York City, or any of their branch offices.

Lambie Elected President of Wheat Lamp Sales Company

Announcement has been made by the Wheat Lamp Sales, Inc., of Pittsburgh, Pa., of the election of Robert M. Lambie, of Charleston, former Chief of the West Virginia State Department of Mines, as president of the sales company. Since his retirement as the head of the West Virginia State Department of Mines Mr. Lambie has been in charge of sales for the Liberty Powder Company, maintaining offices in Pittsburgh and Charleston. His election to the presidency of the Wheat organization became effective on May 15 and he will direct the sales in the Eastern Bituminous coal fields of the Wheat Electric Cap Lamps and Koehler Flame Safety Lamps. They are manufactured by the Koehler Manufacturing Company, of Marlboro, Mass.

Mr. Lambie is one of the best known men in the coal mining industry of the nation. For 14 years he served as Chief of the State Department of Mines in West Virginia and prior thereto had served as a district inspector. His mining experience in the practical operation of coal mines came from his service with the McKell and New River company mines. As Chief of the State Department he was largely responsible for arousing in the industry an increased interest in the safety movement.

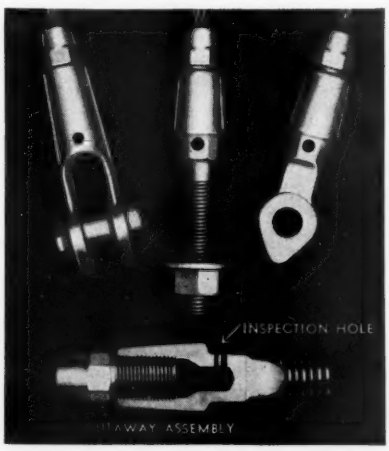
Allis-Chalmers Opens Charleston Office

Allis-Chalmers Mfg. Company has just established a new branch office in the Knight Building, Quarrier and Hale Sts., Charleston, W. Va. Mr. R. L. Halsted, formerly connected with the company's Cincinnati district office, has been made branch office manager.

An Improved Wire Rope Connector

Wherever wire rope is used in the coal mining industry, the improved Electroline-Fiege Connector is proving its effectiveness. The connector is of vibration damping design. It grips the cable with graduated compression, feathering off from maximum at the rear to zero at the front. This design prevents "weak point" crystallization at the point of connection and thus insures longer rope life.

The connector is a compact, streamlined assembly of three simple units—a sleeve which slips over the end of the wire rope, a tapered plug which is inserted to separate and hold the strands of wire in the sleeve and a covering socket which securely locks the cable. Installation may be made



with ordinary mechanic's tools, and no hot metal is required. A unique feature of the connector is an "Inspection Hole" which enables the workman to see at a glance the perfection of the twist joint, with complete bond between cable, tapered plug and sleeve.

For rope sizes of ¼ in. and larger, the Standard Connector is available in black, hot-galvanized and cadmium-plated finishes. For rope sizes ½ in. and smaller, the Industrial Connector is available in black-hot-galvanized, and cadmium-plated steel; also in bronze, stainless steel and monel metal. A new data book on Electroline-Fiege Connectors may be obtained from the Electroline Company, 4023 South LaSalle St., Chicago, by specifying Bulletin F-2.

Bronze Numbering Plates

The Mosebach Electric & Supply Co., 1152 Arlington Ave., Pittsburgh, Pa., has recently developed a line of cast bronze numbering plates for marking purposes such as the numbering of face and butt entries, etc. Cast in one piece from rust-proof, acid-

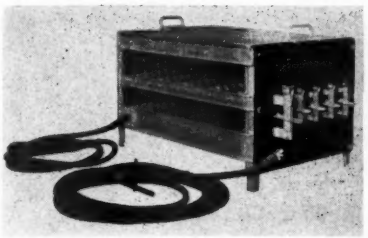
resistant bronze alloy, the new plates are available in any size up to 3 ft. by 2 ft. Minimum thickness is ⅛ in.

The markers can be supplied in any style or any combination of letters and figures. Because of the fact that these letters and figures are part of the plate itself, and because they are raised from the surface of the plate, they never lose their high visibility. Tampering cannot mar the plate or change the original letters.

Fitted with a shank and clevice arrangement for hanging, the plates can, if desired, be drilled for bolting onto flat surfaces. They are ideal for permanent marking in areas which are exposed to heat, moisture, or acid. The manufacturer will be pleased to supply additional information upon request.

D-C Arc Welder For Mine Service

General Electric Company, Schenectady, N. Y., has announced a new resistor-type, d-c arc welder designed particularly for mine service. Por-



tability and sturdy construction are among the chief features of this new welder.

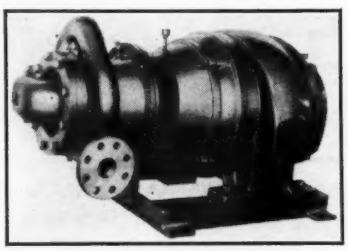
It is only 17 in. high, 20 in. wide, and 30 in. long, and weighs but 78 lbs. To withstand rough handling successfully, the resistor units are wound in continuous coils without joints and are supported by spool-type porcelain insulators. Enclosing screens protect the interior from falling material.

Welding current can be adjusted over the welding range, in 10 steps of approximately 17 amperes each, by means of five heavy knife switches. It is nominally rated at 250 volts, and will operate on a power line of 225 to 275 volts.

Multi-Stage Unit Pumps

Allis-Chalmers Mfg. Company, Milwaukee, Wis., has recently extended its line of multi-stage "SSUnit" pumps in which the motor and pump housings are bolted together for compactness. This includes a new two-stage pump with 4-in. suction and 2-in. discharge that can be rated up to 275 gallons per minute against heads up to 500 ft. at a speed of 3550 rpm.

The new pump, like the company's smaller multi-stage pumps of this type, has cast iron casing and cover, and is bronze fitted throughout. The



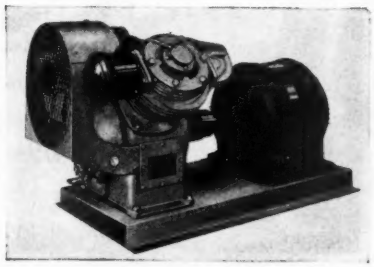
impellers are placed back to back to provide axial balance. The cover can be readily taken off, permitting the inside parts to be removed without disconnecting the suction and discharge piping. The stuffing box on the pump is only subjected to suction pressure.

This unit can be furnished with either an open, splash-proof, totally enclosed or explosion-proof motor. It is suitable as a small boiler feed pump, mine pump, or pipe line pump. It can be used in humidifier work, air conditioning service, oil loading and many other small capacity, high pressure services. Bulletin B-6105 will be sent on request.

Small Compressor

A new small stationary compressor of precision design is being offered by Sullivan Machinery Company, suitable for small industries and for standby service. It is compact, light weight and smooth running, requiring little floor space and minimum power.

This WL-70 is a two-cylinder, single stage compressor with complete air cooling, built-in aftercooler, force feed



lubrication, heavy duty ball main bearings, low lift, long life valves, air filter silencers on each cylinder, automatic regulation, and easy accessibility for inspection.

There are five sizes: 96 to 233 cfm. displacement, 15 to 30 hp., air pressures 30 to 125 lbs. The smallest size is only 2 ft. 5 in. long, 2 ft. 9 in. wide, 2 ft. 4 in. high. These WL-70 Unitairs are supplied as complete motor driven units on rigid steel sub-base, direct connected or V-belt driven; also less sub-base with V-belt sheave or flat belt pulley.

Ask for Bulletin A-34, Sullivan Machinery Company, Michigan City, Ind.

Cleaning Equipment Contracted By Jeffrey

The Jeffrey Company has recently been awarded a contract by the C. W. & F. Coal Company of Benton, Ill., for a large 7-ft. Baum Jig to clean 500 tons per hour of 6 x 7/16-in. coal; and by The Princeton Mining Company for considerable cleaning plant equipment including a large 7-ft. Baum Jig to clean 450 tons per hour of 6 x ¼-in. coal.

Catalogs and Bulletins

• DIESEL ENGINES. *Chicago Pneumatic Tool Co.*, 6 E. 44th St., New York City. Bulletin 768 (second edition) on CP Type 8 and 9 Diesel Engines for continuous heavy-duty stationary service. 16 pages.

• ELECTRICAL EQUIPMENT. *Allis-Chalmers Mfg. Co.*, Milwaukee, Wis. Bulletin 6033 on company's larger Coupled and Engine Type Synchronous Motors, covers their detailed construction and illustrates many significant installations. 28 pages.

Bulletin B-6064 describes and illustrates company's standard multi-anode rectifiers and provides information on their recently announced Excitron single-anode rectifiers particularly suited for the lower voltage applications from 250 to 300 volts. 40 pages.

General Electric Co., Schenectady, N. Y. Bulletin 1607-C on company's Direct-Current Generators and Exciters—Type B, with information on construction features, modifications, and available ratings. 4 pages.

Bulletin 1993-F on "Enclosed Indicating and Dropout Fuse Cutouts." 12 pages.

Bulletin 3225 on "Power-Factor and Its Improvement" describes the principles and applications of G-E Pyranol Capacitors, with examples of application cautions and graphs and tables showing calculation of capacitor sizes. 16 pages.

Bulletin 3250 describes a new Smaller Magnetic Starter. 4 pages.

Bulletin 3259 on company's new Magnetic Contactors for Battery-Vehicle Control. 2 pages.

Bulletin 3339 on company's Type T-27 General-Purpose Automatic Time Switch. 8 pages.

I-T-E Circuit Breaker Co., 19th & Hamilton Sts., Philadelphia, Pa. Bulletin 4001 describes the new Type KB Circuit Breakers for switchboard, open or deadfront, and for all types of individual enclosures. 8 pages.

Ohio Brass Co., Mansfield, Ohio. Bulletin 688-H on "O-B Spools and Insulated Clevis Assemblies." 2 pages.

Bulletin 693-H on "O-B Intermediate Universal Strain Clamp." 2 pages.

Bulletin 696-H presents a plan which simplifies the selection of O-B Switch and Bus Insulators—telling how to judge station posts, describing design features, and presenting four pages of useful handbook data with complete catalog information on company's conventional insulators of the pin and cap type and those of the post type. 32 pages.

Bulletin 702-H on "O-B Conduction-Glazed Silentype Insulators." 2 pages.

The Trumbull Electric Mfg. Co., Plainville, Conn. Circular 315 describes six different types of enclosures for Safety Switches, Motor Starters, Circuit Breakers, and Service Equipment, for special applications in various locations where dust or volatile fumes are prevalent. 4 pages.

Circular 322 illustrates and explains in detail the many exclusive features of company's entire line of across-the-line magnetic starters. 4 pages.

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. Catalog section 75-050 on company's line of type RSD air-cooled railway signal transformers in weatherproof cases, designed especially for pole cross-arm mounting. 2 pages.

• ENGINEERING DATA. *Allis-Chalmers Mfg. Co.*, Milwaukee, Wis. Directory of engineering literature, bulletins, and the hundreds of different products made by the company. 36 pages.

• SCREENS. *Allis-Chalmers Mfg. Co.*, Milwaukee, Wis. Bulletin B-6088 describes Sta-Kleen Low-Head Horizontal Screen with the "ball deck" that gives a secondary vibration to prevent blinding, and points out the operating advantages of this arrangement. 8 pages.

Link-Belt Co., 307 N. Michigan Ave., Chicago, Ill. Catalog 1762 on Link-Belt Vibrating Screens for the effective screening of a great variety of materials. 20 pages.

• VENTILATION EQUIPMENT. *The Jeffrey Manufacturing Co.*, Columbus, Ohio. Bulletin 739 describes Jeffrey Blowers for coal and metal mines. 4 pages.

• WIRE ROPE. *American Cable Division, American Chain & Cable Co., Inc.*, Wilkes-Barre, Pa. Folder illustrates and describes various applications of Tru-Lay Preformed Wire Rope in coal mining, including recommendations of specific types and sizes for various applications, together with several tables of strengths, weights, and prices of ropes commonly used in mining. 16 pages.

Pamphlet cites advantages of Tru-Lay Preformed Wire Rope for use in strip mining. 4 pages.

New Gardner-Denver S73 SINKING DRILL

Here's the new speed and power necessary to drill faster in harder ground—to drill deeper holes—without the handicap of more weight!

It's the new Gardner-Denver S73 Sinker, weighing only 67 pounds. It uses no more air than the average 55-lb. drill . . . has excellent holding characteristics enabling the drill runner to maintain a high rate of drilling speed throughout the shift.

The new Gardner-Denver S73 Sinker is ideal for shaft sinking where increased footage in hard ground is desired. Get complete facts on this time-saving, cost-saving, easier-handling drill—write for bulletin. Gardner-Denver Company, Quincy, Illinois.

SPECIFICATIONS

Type of Drill	Wet or Dry Sinker
Length of Drill overall	Collared, 25"; Lugged, 24½"
Hammer Diameter	2¾"
Size of Steel recommended	⅞" to 1¼" Hex., Rd., or Q. O.
Size of Air Hose recommended	¾"
Size of Water Hose recommended	½"
Weight with Lugged Chuck (Wet)	74 lb.
Weight with Collared Chuck (Dry)	67 lb.
Weight boxed for shipment	100 lb.

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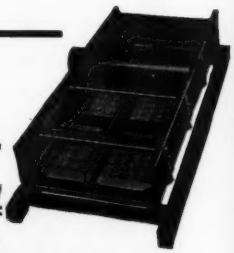

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Fifteen years ago we introduced preformed wire rope—American Cable TRU-LAY. We did so not only because preforming made TRU-LAY a rope of longer service but—a safer rope. TRU-LAY Preformed is safer to handle; safer to use. The heritage of safety is a tradition with American Chain and Cable men. The entire organization stands as a single unit behind the true meaning of "*In Business for Your Safety.*"

BUY ACCO QUALITY *whether it is American Cable Wire Rope and Slings—American Chains (Weed Tire Chains, Welded and Weldless Chains)—Campbell Abrasive Cutting Machines—Ford Chain Blocks—Page Wire Fence—Page Welding Wire—Page Traffic Tape—Reading-Pratt & Cady Valves—or any other of the 137 ACCO Quality Products.*

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